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Incorporating

Aeronautical Engineering

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Founder and First Editor
(1911-1939), C. G. GREY

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# DECIBELS ON THE CLIMB

TWO subjects are much in the fore among aeronautical people at the moment: one is the question of fare differentials and the other that of noise. Both are important to various sections of the British aeronautical community. But in our view the one that most requires a firm Government attitude is that of noise. If we let a decision go by default it will be impossible to recover the initiative. Moreover British aircraft come out well from this aspect.

Since we wrote an editorial (THE AEROPLANE, July 25) on the need to deal with the noise problem on an international basis discussion has been getting wider and wider. We are sorry to discover that there is quite a body of opinion that we are going the best way about it to lose business by sticking out for acceptable noise-levels from aircraft using airports close to great cities. In such circles the argument is used that while we are being awkward about admitting the Tu. 104 to L.A.P. other airports are being much less fussy.

It has been well put by a correspondent (he does not hold that point of view) who avers that some aerodromes in Europe will do anything to get traffic, and unless the British authorities get some form of international agreement we can hardly expect the manufacturers or operators to build or use aircraft that have some economic disadvantage because of noise-suppression measures.

This does bring up the basic problem that it is only by some form of international agreement that the necessary action will be forthcoming. What are the bodies to bring about international agreement: IATA and ICAO. The former has already got some sizeable problems on its hands. The second is hardly under the political pressure that is already beginning to bear on the elected representatives of dwellers around busy urban airports. And we have to face the fact that international action can only be brought about by lengthy negotiations. So it must be years before results will be achieved in this field.

However, the Port of New York Authority has been taking a stand on this matter. The British Ministry of Transport and Civil Aviation has followed suit. In the United States the decision has been taken that the noise made by a certain four-piston-engined airliner shall be regarded as the limit and all aircraft using New York have got to demonstrate that their noise level is not higher than that of the selected aircraft.

We made this point in our earlier editorial that the first step in action to ensure that noise does not rise above acceptable levels is to produce some sort of specification. This is not easy. Anybody who has spent five minutes with experts on the subject knows what happens. Measurements in decibels is not enough; some seek to make the business more precise by calling for measurement in phons. Others are not absolutely certain about what makes a noisy noise. Some people are particularly allergic to high-pitched noise yet the alteration by structural means of low-pitched noise to high-pitched noise has been regarded as one way of ameliorating the problem.

Some time ago we published (THE AEROPLANE, March 14 last) a note on an investigation carried out for the Port of New York Authority by a firm of acoustical consultants. This report is worthy of special study as much of the work was done with a Comet at Hatfield.

The report also brings out the fact that the problem of airport noise is not simply the comparative values of noise emitted by particular aircraft on the ground. What the ordinary public (and electors) are concerned with is the amount of noise which they have to endure in their own homes.

One does not have to read the report very far to realise that a most important aspect in such a study is the relationship of dwellings to runways and to runway approaches and then to the height at which any particular aircraft passes over those houses. If two noisy aircraft climb regularly out of a given airport, the aircraft which climbs more steeply is going to be regarded by the people living on that route as the quieter of the two aeroplanes. In other words, the angle of the climb path of any given aircraft is a matter of much importance in this study.

Now some new jet aeroplanes, the noise-levels of which are the concern of the present studies, are characterized by the great length of their take-off runs. This is bringing about a very widespread activity to lengthen runways. The same characteristics control the angle of the climb paths out of the airport and, as these are very much flatter than those at present flown, a much bigger number of people are going to be affected by the noise of the aircraft even if it were no more than the noise of aircraft at present in service. And, in fact, the new aircraft are going to be much noisier.

The problem is obviously extremely difficult. Indeed it is so difficult that some people can be found to make a case for operating heavily loaded long-range jets only from aerodromes so far from urban centres that the noise of their departure will not affect many people. This is scarcely likely to be popular as a solution when the object of using jets is to save time.

# MATTERS OF MOMENT

## Warming Up for the Show

BY the time these words appear the annual flying display and exhibition of the S.B.A.C. will be only three weeks away, and much preparation has already been made at Farnborough.

The display opens on Tuesday, September 2, the preceding day being reserved as Press and technicians' preview. September 2, 3 and 4 are to be reserved for guests of the Society, and the public will be admitted on Friday, Saturday and Sunday, September 5, 6 and 7. The gates will be opened at 10.00 hrs. and flying will start at 15.00 hrs.

Emphasis is again being placed on guided missiles, the park for which will be nearly 50% greater than last year's, and "live" demonstrations will be staged with some of the weapons. Crews will show launching preparations and how certain equipment is used operationally—everything, in fact, but the actual firing.

Among new aircraft to be seen at the Show will be the D.H. Comet 4, the Saunders-Roe P.531 helicopter (described in this issue), the Fairey Rotodyne, Westland Westminster and Bristol 192 helicopters, the Blackburn NA.39 strike aircraft and the Handley Page Dart Herald.

The outside equipment display will be 30% larger this year. Some 330 companies will be exhibiting, some of them having more than one stand.

For ourselves, THE AEROPLANE will as usual present a British Aircraft Industry Number, to be published on August 29, price 2s. 6d. It will contain a special colour supplement and contain many features relevant to the industry and its representation at Farnborough.

This issue will be followed by a First Report on September 5 and a Second Report on September 12, each of which issues will cost the usual 1s. 6d.

## A New Chief Engineer

ARMSTRONG SIDDELEY MOTORS, LTD., has announced that Mr. Sidney Allen, M.I.Mech.E., F.R.Ae.S., formerly chief engineer (rockets), has been appointed chief engineer for all of the company's products except motorcars.

Mr. Allen will be directly responsible to Mr. W. H. Lindsey, M.A., M.I.Mech.E., F.R.Ae.S., the technical director of the company. He is aged 49 and was educated at Wellington School, Somerset. From 1926 to 1930 he was apprenticed to Petters, Ltd., at Yeovil, and remained with that company as a designer draughtsman until 1934, when he went to Armstrong Siddeleys. There he became chief combustion engineer and then assistant chief engineer.

In addition to the range of aero-engines, motorcars and rocket engines, Armstrong Siddeley is building air-cooled Diesel engines, auxiliary gas turbines and air starters. Large Maybach Diesels are to be built under licence.

## Another Export Increase

THE Society of British Aircraft Constructors has announced that the aircraft industry's export trade has now comfortably exceeded £700 million since the end of the War.

The actual post-War total is £708,956,075, which has been reached by record sales during the first six months of this year, when £77,208,814 worth of aviation goods were sold abroad—46% more than in the same period of 1957 (£52.9 million). This compares with £55.9 million, £30.7 million and £29.7 million in the corresponding periods of 1956, 1955 and 1954 respectively.

The industry is thus maintaining its record annual rate of £154 million (which works out at about £13 million a calendar month or £3 million a week), compared with the record annual total of £116.5 million achieved in 1957.

For the second quarter of 1958 the total was £40,803,529 which was itself an improvement of £2.5 million over the first quarter. Both the aircraft and parts (£27,034,847) and aero-engine figures (£12,380,001) for the April-June period were the highest for any three-month period.

In June of this year the total was £12,623,933, 28% up on June, 1957. Aircraft and parts accounted for £8,087,371; aero-engines, £4,163,338; electrical appliances, £203,248; tyres, £31,597, and aeronautical instruments, £138,379.

The leading buyers of aircraft and parts during the month were India (£2,007,759); Canada (£1,525,865); West Germany (£1,211,722); and the U.S.A. (£1,122,073).

SUMMER SCENE.—At this time of the year it is customary for members of the University Air Squadrons to join R.A.F. stations for their annual summer camp. Here are members of the Glasgow U.A.S. with their Chipmunks at R.A.F. Thorney Island.

*Photograph copyright "The Aeroplane"*

## Those Differential Fares

DURING nearly two years air transport has been the forum for arguments about the principle of fare differentials by type. In general the contestants have divided themselves quite neatly and cynically according to whether they are manufacturers or major purchasers of turbojets or turboprops.

For ourselves, we have tended to take the side of the differential protagonists because it seemed that this might be one way by which the upward fare trend could be stopped and more people encouraged to use air transport, and because we have always felt that, with reservations, it is better to let service and fare standards find their own levels without too much control. The views expressed in "A Lost Horizon?", in our issue of April 11, p. 501, might be taken as typical.

In recent months it has seemed fairly obvious that no major decisions are likely to be made until the turbojets are in service and the actual costs of operating them are known.

For the present, the turbojet protagonists are working on paper figures. So we must disagree with the writer of an article in *The Economist* of August 2 who says that "jet airliners are proving less expensive to operate than was thought." Such a statement cannot be made categorically at this stage. Nor, as said in this article, has anyone very seriously suggested that there should be a surcharge for turbojet flights. All that the "differentialists" have said is that it would be rational to charge less for slower and less comfortable services. In their turn, the "anti-differentialists" have said, in effect, that it would be unfair to institute a principle which would tend to price them out of business in the earlier stages of turbojet operation.

## Developing the Turbine Requirements

ACCORDING to *Aviation Daily*, new turbine-powered aircraft performance requirements are due to come into force in the U.S.A. on September 30 this year. These requirements, promulgated in the C.A.B.'s SR-422A, include important modifications to the take-off regulations.

For instance, an all-engines-operating take-off distance, factored by 1.15, must be met, and this distance is related to the engine-out figure. This requirement follows the tendency with modern aircraft for the engine-out distance to be no more critical than that with all engines. Take-off distances to 35 ft. will include that of "clearways" up to 600 ft. long; such clearway distances will not, however, be permitted for use in calculating accelerate-stop distances.

Because of the time taken to rotate modern aircraft into their take-off attitude at $V_2$, a new speed, $V_R$, is to be used. This is the speed at which nosewheel raising action is initiated and is presumably calculated so that the aircraft will be about to become airborne at $V_2$ speed. The take-off flight path is to be calculated to a minimum altitude of 1,500 ft. instead of 1,000 ft., and the minimum climb gradients will be reduced.

## Not So Sluggish

DIRECT HITS on target aeroplanes have been achieved with unarmed versions of the Armstrong Whitworth Seaslug ship-to-air missile. Inert rounds without warheads have been fired from Aberporth and from the Royal Navy trials ship, H.M.S. "Girdle Ness."

The latest Seaslug (illustrated in THE AEROPLANE last week) has a solid-fuel sustainer rocket in place of a bi-propellent system using nitric acid, as shown at the S.B.A.C. Show last year. Solid fuel is less dangerous to handle than liquid propellents, an important point for marine use.

The four booster rockets are, of course, retained. For the first time at the S.B.A.C. Show this year, a propulsion test vehicle for Seaslug is being shown with these four boosters. This test vehicle will be mounted on a non-standard launcher because the multi-round launcher used on board ship is too large for display purposes.

On the Hawker Siddeley stand will be a model of H.M.S. "Successful" with sides and deck cut away to show how Seaslugs are stored, tested, handled and fired from a multiple launcher. Four guided-weapons destroyers in the "Hampshire" class have been ordered for the Royal Navy.

Companies associated with Sir W. G. Armstrong Whitworth Aircraft, Ltd., in developing the Seaslug weapon system are E.M.I. Engineering Development, Ltd.; the General Electric Co., Ltd.; Sir George Godfrey and Partners, Ltd.; Imperial Chemical Industries, Ltd.; McMichael Radio, Ltd.; Metropolitan-Vickers, Ltd.; The Sperry Gyroscope Co., Ltd.; the John Thompson Conveyor Co., Ltd.; and Vickers-Armstrongs (Aircraft), Ltd.

NEW POST.—Air Cdre. G. J. C. Paul, C.B.E., D.F.C., whose appointment as secretary-general of the Air League is reported overleaf.

## National Gliding Week

AT Dunstable, one of the three sites where contests were simultaneously held between July 27 and August 4, National Gliding Week was officially opened on Saturday, July 26, by Mr. B. J. Hyde, chairman of Luton Rural District Council, in whose region the London Gliding Club operates. Weather was such as to make the scoring unspectacular.

The leading final placings were:—

**London Gliding Club, Dunstable:** 1, Sgt. A. Gough (R.A.F.), 419 (426 pts.); 2, C. A. P. Ellis, Skylark 3 (379); 3, Wg. Cdr. Kearon, Skylark 3 (342); 4, Flg. Off. F. D. Cretney, Skylark 3 (339); 5, Dr. D. B. James, Skylark 2 (291).

**Bristol Gliding Club, Nympsfield:** 1, Cdr. H. C. N. Goodhart and J. Williamson, Skylark 3 (310 pts.); 2, G. Burton and J. C. Neilan, Olympia (192); M. V. Laurie, L. and A. Welch, Eagle (192); 4, P. Scott and P. Collier, Eagle (191); 5, L. Redshaw, Olympia (169).

**Scottish Gliding Union, Portmoak:** 1, W. N. Tonkyn and B. J. Davey, Skylark 3 (353 pts.); 2, A. J. Thorburn, Olympia (122); 3, W. Lawson, Eagle (64); 4, D. P. Docherty and C. Ross, Olympia (30).

Two pilots flew *hors concours* and their scores were: P. A. Wills, Skylark 3 (366), G. H. Stephenson, Skylark 3 (364).

## The Latest Gyron Junior

FURTHER information is now available on the de Havilland Gyron Junior D.G.J.10, first mentioned in our issue for November 29 last, when it was the intended turbojet for the Saunders-Roe P.177 mixed-powerplant fighter.

The Gyron Junior is essentially a supersonic engine although its only announced application so far is for the subsonic Blackburn NA.39 which has two 7,000-lb. thrust D.G.J.1 engines. Possible applications for the D.G.J.10—which probably has a five-figure thrust—are for a version of the Avro stand-off bomb (THE AEROPLANE, September 6, 1957) or for a Canberra-replacement aeroplane with supersonic performance. De Havillands have said that the D.G.J.10 obtains its performance partly by using a turbine inlet temperature of 2,000°K.

Inspection of the released photograph indicates that there are several differences from the D.G.J.1 shown at the S.B.A.C. Show last year. These include a larger-diameter combustion system and turbine; a fabricated steel (instead of a cast light-alloy) intake; a separate oil tank on the port side, and a Dowty fuel system underneath.

At the forthcoming S.B.A.C. Show a Gyron Junior D.G.J.10 is to be shown, complete with an afterburner which increases the basic thrust by about 40%. The engine appears to have a nine-stage compressor and a two-stage turbine. An annular combustion chamber doubtless uses the Gyron-family upstream fuel-injection layout.

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## The Air League's Secretary-General

SINCE Mr. Frank N. Hillier, M.C., retired through illness from the Air League of the British Empire at the end of last year the post of secretary-general has been vacant. It is now announced that Air Cdre. G. J. C. Paul, C.B.E., D.F.C., has been appointed in his stead, and will take up his duties on October 8.

Air Cdre. Paul, who is at present Director of Operational Training at the Air Ministry, has had wide experience in aviation. He was born in 1907 and educated at Cheltenham and St. John's College, Cambridge, where he obtained a degree in Mechanical Sciences. He was a member of the Cambridge University Air Squadron, and on leaving the University took a regular commission in the R.A.F., and served for the next four years in the Fleet Air Arm, ashore and afloat, at home and overseas.

During 1932-34 he qualified as an Engineering Officer, thereafter returning to the F.A.A. for another four years on engineering and test-flying duties.

In 1939 he attended the R.A.F. Staff College and afterwards became an instructor at the Army Staff College, later serving in France and in various staff and training posts. His next appointment was as commander of a squadron in No. 2 Group in 2nd T.A.F., and he also commanded stations within No. 2 Group.

His experience also extends to service at the U.S.A.F. Air War College at Alabama, where he gained detailed knowledge of the U.S.A.F., the U.S. aircraft industry and civil flying.

Returning from America he was for four years a Director of Intelligence at the Air Ministry and then went to the Imperial Defence College. He was then appointed Commandant of the Central Flying School, during which time he led missions to the R.C.A.F., the U.S.A.F. and the U.S. Navy.

It may well be expected that Air Cdre. Paul, who has done so much to raise the interest of the R.A.F. in gliding, will continue his interest in the sport. We hope so.

We are glad to learn that Mr. Hillier, who was secretary-general of the Air League and editor of *Air Pictorial* from 1950 to 1957, is now out of hospital, and we sincerely hope that he will make good progress.

## A Fiftieth Anniversary

WILBUR WRIGHT'S first flight in Europe took place on August 8, 1908, at Les Hunaudières, a barren heath surrounded by woods, used as the local racecourse, nearly in the centre of the quadrangle of roads now forming the famous circuit near Le Mans, in Western France.

None, except helicopter pilots, would now think of using such a poor ground as an airfield, interspersed as it is with ditches, hedges and clumps of trees, but Wilbur Wright, who was acting on behalf of his brother as well as himself to negotiate the rights for their machine in Europe, found it convenient enough and especially worthwhile as a demonstration ground, because of its very mediocrity.

After their failure to interest the American public and U.S. Army authorities, the Wright brothers had entered into negotiations with various people in Europe. They had come to England and France in 1907 for a few months' visit, leaving at Le Havre crates containing a half-finished machine, and they had given an order to a French firm of engineers (Barriquand and Marre) to make for them an engine following the pattern of their 1906, vertical four-cylinder model.

In May, 1908, Wilbur alone had come back to France to show what their machine could do and to try to sell the licence to a company recently formed in France by financiers headed by M. Lazare Weiller.

A Le Mans group of motorists heard of their quest and made them the offer of the Hunaudières racecourse, the property of the Le Mans Jockey Club. These were the same men who, in 1906, had originated the Automobile Club de la Sarthe, later on called "de l'Ouest," the A.C.O. of today, responsible for the yearly famous 24-hr. race. They had formed an aeronautical section, headed by the well-known industrialist Léon Bollée, the son of Amédée Bollée, an early pioneer of the motorcar, and himself a clever engineer. Léon put his Le Mans motor factory at Wilbur's disposal to assemble his machine.

He, practically alone, assembled it, trusting to no one but himself, sleeping on the premises close to his machine, working on schedule like the other workmen in the factory.

* * *

The news steals through into town and the Le Mans people are thrilled with curiosity. Wilbur is at once very popular with them in spite of his secretiveness, on that very account perhaps. They call him, not being able to pronounce his name, by the nearest equivalent of "Vieille Burette"—"Old Oil Can."

Hope rises high on August 5 when they learn that the machine has been taken to Les Hunaudières. And so, we come to Saturday, August 8, the date of the famous first flight.

* * *

It was far from certain that Wilbur would make an attempt on that very day. He strictly refused to publicize his plans and turned out every inquisitive reporter and photographer, hence the very small number of photographs taken at that time. A certain number of stubborn onlookers, though, kept coming to the *terrain* day in and day out, in eager expectancy.

A schoolboy of 13, then on holiday, I was among them, having pedalled the four miles from Le Mans on my *bécane* (bike), the first of a long series of gaping waits to see the American *homme-oiseau* fly. There were more distinguished personalities among us: Archdeacon and Surcouf, of the French Aéro Club, both rather sceptical, Louis Blériot, Ernest Zens, some journalists, and, of course, the whole committee of Manceau enthusiasts, Léon Bollée among them.

* * *

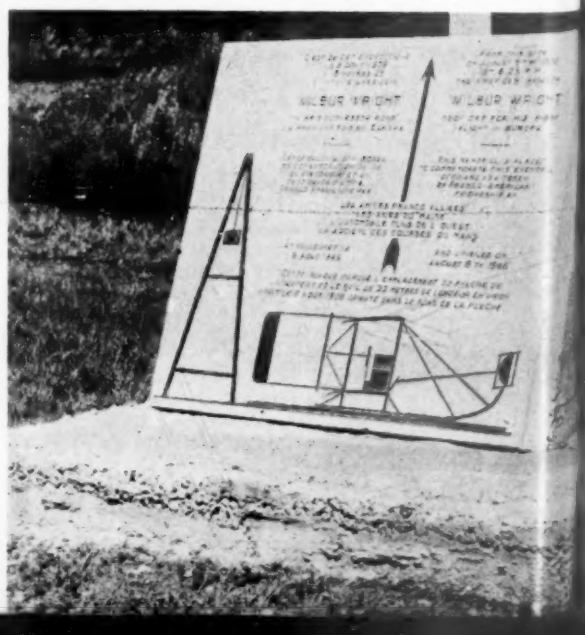
We have been well inspired to stick it out. About 6 p.m. a team of volunteers is ordered to hoist the weight on top of the legendary derrick, or pylon, which, through a system of pulleys, was used to catapult the machine along a central launching rail. The engine is started, Wilbur sits down on his crude seat; he accelerates the engine, releases the weight, and the machine glides forward. I shall never forget that first flight.

With unearthly ease, he banks to the left and laps three times over the impossible ground, keeping well within the threatening border of trees, at a height of some 30 ft., and finally, gracefully lands close to his starting rail. The epoch-making flight had lasted 1 min. 45 sec.

* * *

There was a mad cheer among the crowd rushing towards him, some of the spectators wanting to chair him. He kept cool and distant, apparently more concerned with a few little mistakes he pretended to have made in his piloting than with the enthusiasm of the public.

Wilbur Wright was to stay 10 more days on the makeshift aerodrome, good enough for him, though, because of his using landing skids instead of wheels, flying on August 10, 11 and 13, each time performing better and for longer spells. When landing on that last day he hit the ground with his left wing and "broke wood," which put an end to the experiments for a few days. Then, on August 18, invited by the French military authorities, he moved his repaired machine to the roomier Camp d'Auvours, seven miles eastward.—HENRI DELGOVE.




The simple stone memorial which marks the site of Wilbur Wright's flights at Les Hunaudières, Le Mans, in 1908.

*Photograph copyright "The Aeroplane"*

# News of Aircraft, Engines and Missiles

**NEW CANBERRAS.**—Another new version of the English Electric Canberra—the T. Mk. 11—is announced. It is a modification of the B. Mk. 2, with two Rolls-Royce Avon turbojets, and is to be for training pilots and navigators of all-weather fighters in the use of A.I. radar. The radar is mounted in the nose and the T.11 carries a crew of four, two of whom are pupils. Modification of the T.11 was done by Boulton Paul Aircraft, Ltd., at Wolverhampton. A picture of a Canberra experimentally fitted with the Ferranti AIRPASS nose radar and fire control unit was published in THE AEROPLANE of July 4. The first production Canberra PR.9 built by Short Brothers and Harland, Ltd., was flown by Mr. Peter Hillwood for 40 min. at Belfast on July 27.

**LONGER LIFE.**—Three months after the increase in overhaul life of the Bristol Proteus 705 turboprop (as fitted to the Britannia) to 1,300 hr., the A.R.B. has now granted authorization for a further extension to 1,600 hr. Engines are now being run on trial to 1,900 hr. between overhaul.

**COURSE RECORD.**—The Tokyo-Washington, D.C., point-to-point record set up by the Boeing KC-135 Stratotanker (four Pratt & Whitney J57-43W turbojets) on April 7-8 has now been officially confirmed. The aircraft, piloted by Brig.-Gen. W. E. Eubank, covered the distance in 13 hr. 45 min. 46.5 sec. at an average speed of 792.219 k.p.h.

**JET APPROVAL.**—The Westinghouse J34-WE-46 turbojet has been officially approved for use in U.S. Navy aircraft following the 150-hr. military qualification test made by two identical engines. It incorporates a new compressor and new combustion chamber, and other modifications to allow the use of JP4 and JP5 special fuels. The new engine is to power the North American T2J being produced for the U.S.N.

**POLAR FLIGHT.**—The U.S. Navy Goodyear ZPG-2 airship which left Weymouth, Massachusetts, on July 27 on the first leg of a 9,400-mile flight to take it within 600 miles of the North Pole, was delayed by bad weather. The ultimate destination is the 45-sq.-mile ice island known as T-3, which is being manned by U.S. scientists throughout the I.G.Y. The ZPG-2, which carries a crew of 14 and a group of scientists, was due back at Weymouth on August 7.

TILT-WING TAKE-OFF.—Looking as though it might have been the inspiration for the Air League's R.34 memorial, the Vertol 76 VTO aircraft, known by the U.S. Army as the VZ-2, is here seen airborne.

**NO HANDS.**—Using the Bell aircraft automatic all-weather landing system, a Boeing 707 made three pilotless test landings at Boeing Field, Seattle, on July 1.

CARIBOU FLIES.—The D.H.C.4 Caribou 28-seat utility transport, seen in this impression, made its first full flight on July 30, following short hops the day before. The Canadian Government has placed an initial order on behalf of the U.S. Army and deliveries are to begin in 1959. The engines are 1,450-b.h.p. Pratt & Whitney R-2000s.

**CIVIL BELL.**—The Bell Helicopter Corpn. has announced that steps are being taken to have the HU-1 military helicopter (825-s.h.p. Lycoming T53 turbine engine) certificated by the C.A.A. for civilian use. Civil versions will be known as the Model 204.

**F-102 MODIFICATIONS.** — The Convair Division of the General Dynamics Corpn. has been awarded a new $4,475,000 contract for modification work on the F-102A Delta Dagger.

**ROUND AND ROUND.**—At 20.21 hrs. on July 27 the Russian satellite Sputnik III completed its 1,000th circuit of the Earth; it was then taking 105 min. 6 sec. to complete a circuit—51 sec. less than when it was placed in orbit on May 23, 1958. Its maximum distance from the Earth was 1,118 miles, compared with 1,167 miles at the outset.

**BRITISH OXYGEN.**—As a result of a typographical error in our July 25 issue, the British Oxygen Company's new range of transportable equipment was referred to as being developed by Bristol Oxygen. We regret this confusion between two very well-known aeronautical names.

MISSILE ARMED.—The D.H. Sea Vixen FAW.1 (two Rolls-Royce Avons) of the Royal Navy now carries four D.H. Firestreak air-to-air missiles. There is also a pylon under each wing for an auxiliary fuel tank.

# News About People

*Photographs copyright "The Aeroplane"*

MEXICAN ARRIVAL.—Last week a D.H. Dove, XB-SUU, landed at Croydon to be sold by R. K. Dundas, Ltd. With it here are Capt. Peter Nock, Mr. Alex Duncan, the company's Mexican representative, and Col. Arthur Chapman, D.S.O.

**ORION POST.**—Capt. M. C. M. Blackburn, B.Sc.(Eng.), has been appointed operations manager of Orion Airways, Ltd., at Blackbushe.

**BENEVOLENT SECRETARY.**—Sqn. Ldr. V. S. Erskine-Lindop, secretary of the R.A.F. Benevolent Fund since 1939, has retired and is succeeded as secretary of the relief branch of the fund by Gp. Capt. C. E. J. Baines.

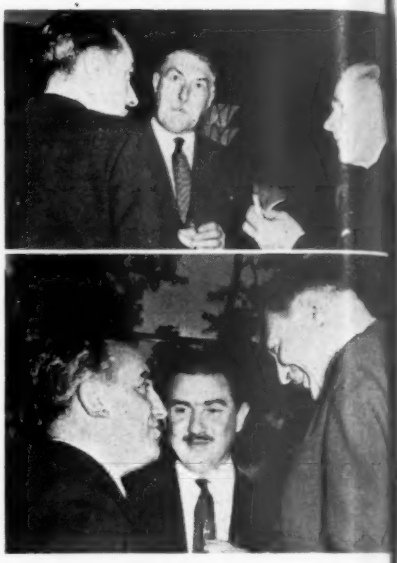
**M.T.C.A. POST.** — Mr. M. M. V. Custance, 42, has been appointed deputy secretary of the M.T.C.A. in place of Mr. A. H. Wilson, C.B., C.B.E., who retired on July 31 and who is taking up a new appointment in the Ministry as adviser on commercial air transport.

**R.Ae.S. PRIZE.**—Mr. Alec G. J. Baker, of Lyndhurst, Hants, has been awarded the R.Ae.S. Prize in Aeronautics as the best student of his year in the diploma course at the College of Aeronautics. He was selected for the course after his student apprenticeship at the R.A.E., Farnborough.

**EXECUTIVE PILOT.**—Mr. P. S. Aked, formerly deputy chief test pilot of Armstrong Siddeley Motors, has been appointed pilot to the United Steel Companies, Ltd., of Sheffield. The company's aircraft will be based at Ringway, and operate also from Netherthorpe and R.A.F. Hemswell.

**U.K. APPOINTMENT.**—The British Aluminium Co. has announced that Mr. P. T. Ensor, formerly general manager of the Canadian British Aluminium Co., Ltd., has now returned to the United Kingdom and has been appointed assistant to the commercial director, Mr. G. W. Lacey.

**A.V.M. W. E. BARNES.**—We regret to record that Air Vice-Marshal William Edward Barnes, C.B.E., Principal Medical Officer, Home Command, R.A.F., from 1950 to 1953, died on July 28. He was 61. In the First World War he served with the R.F.A., transferred to the R.A.M.C. in 1921 and to the Medical Branch of the R.A.F. in 1922. He went to France with the A.A.S.F. in 1939, was P.M.O. with 3rd T.A.F. in Burma, 1944-45, and from 1948 to 1950 was Deputy Director-General of R.A.F. Medical Services.



SAVOY RECEPTION.—Racal Engineering, Ltd., gave a reception on July 25 for delegates to the Commonwealth Conference of the British Joint Communications and Electronics Board. Here are seen (top), left to right, Mr. D. W. Morrell; A.V.M. J. G. Weston, Assistant C.A.S., Signals, and Air Marshal Sir Raymund G. Hart, Controller of Engineering and Equipment, R.A.F. In the lower picture are, left to right, Air Cdre. B. Ball, Bomber Command Signals Officer; Mr. Raymond F. Brown, Racal managing director, and A.V.M. Weston. More than a thousand Racal RA.17 receivers have been sold.

# Commercial Aviation Affairs

**BACK FROM AFRICA.**—The D.H. Comet 4, G-APDA, returned to Hatfield on July 29 after completing tropical trials in Africa. It left Entebbe early that morning, and reached Rome at 10.50 hrs. G.M.T., having completed the 3,200-mile flight with a full payload in little more than 6½ hr. During its two-week absence the Comet also visited Khartoum, Wadi Halfa and Nairobi, and flew more than 60 hr. Tail-down take-offs and icing tests were included in the comprehensive programme. On its return flight Sir Geoffrey and Lady de Havilland were on board.

**IMPROVED FACILITIES.** — Air France's Invalides terminal in Paris has just been entirely renovated, necessitated by a three-fold increase in traffic over the last 10 years. All procedures regarding departure and baggage registration now take place in the underground hall, which measures 410 ft. by 65 ft. Incoming passenger operations are made on the ground floor, at the south end of the terminal.

**K.L.M. AND ELECTRONICS.** — Royal Dutch Airlines' 22,000 flight plans for the 140 different routes operated on the Continent are now pre-calculated by an I.B.M. electronic computer, reducing the pilot's and navigator's pre-flight planning to the reading of a table. By this method, 156 different flight plans for each route, covering every possible weather variation, have been produced. Times of passing prominent landmarks and radio beacons are indicated on each plan. All the flight plans were produced in 10 hr. Pre-flight calculations by the captain are now confined to selecting the appropriate plan and reading off flight time and fuel required.

**AIR FRANCE IN LONDON.**—As we briefly recorded in last week's issue, and coinciding with the first presentation of the Caravelle in England, Air France officially opened their new London offices on July 29. The ceremony was performed by the French Minister Plenipotentiary, M. le Baron de Juniac, and was attended by the president of Air France, M. Max Hymans. The new building is at 158 New Bond Street, W.1, and the offices are designed to accommodate the entire 175-strong staff of the London office.

**WANDERING DOUGLAS.**—A Douglas DC-4, G-APNH, of Independent Air Transport was recently chartered to carry supplies to the Middle East, thereafter being used to carry some seamen from Copenhagen and Athens to Tokyo. This aircraft was built as a C-54B-DC (43-17133) for the U.S.A.F. and after being declared surplus in 1946 was delivered to Twentieth Century Airlines as N37477.

**AMERICAN BUY MORE.**—According to news from the U.S.A. as we go to press with this page, American Airlines have ordered 50 additional turbojet transports — 25 short - medium - stage Boeing 720s and 25 Convair 880s. At the same time American have reduced by five their order for 30 Boeing 707-120s. The order for 35 turboprop Electras still stands.

**LONDON-LILLE.**—Last week Silver City Airways inaugurated a new thrice-weekly Roadair freight service between London and Lille. The air sector is operated by Bristol Superfreighters between Lydd and Le Touquet.

**ICELANDAIR TRAFFIC.**—During the first four months of 1958 Icelandair carried 4,372 passengers on their international services—an increase of 57% on the number carried in the same period last year. Icelandair have had Vickers Viscounts in service for the past twelve months.

**P.A. BY TV.**—Brussels National, which has been open to the public since June 29, is the first airport in Europe to be equipped with television as a means of informing passengers about their flights. One hundred TV screens are used to inform passengers of aircraft movements of some 20 airlines.

# *Air Transport*

## Let us Face the Facts

TWO criticisms of the independent operators were made from different quarters last week. Both deserve words of comment.

In B.O.A.C.'s report—summarized on pp. 194-195—complaints are made of the traffic inroads by Colonial Coach services on the African routes. It may well be that, using Viscounts, these low-fare services have, in fact, been taking traffic from the Corporation's tourist-fare DC-4M services. B.O.A.C. has been unlucky—but if fare and equipment competition is to be denied how can progress be made?

The Airwork/Hunting-Clan Colonial Coach services are, in any case, restricted in frequency to one a week each way—and we now have the ludicrous situation in which the services are booked up for months ahead yet the two operators are not permitted to increase their frequencies. So we have B.O.A.C. unhappy about the Colonial Coach services and the latter turning away good traffic.

The other complaint appears in the annual report of the Air Transport Advisory Council. Too many inclusive tour applications are, the report says, being made and by no means all of those which have been approved are flown. The reasons for this are that the applications have to be made very early—too early for the planning of fleet capacity for different purposes—and that the independents cannot know which tours will finally be approved, so naturally they err on the generous side. In 1957-58, 273 were approved and 179 rejected. What would anyone expect them to do in the circumstances?

## The Solent Accident

AS usual, the report on the accident to Aquila Airways Solent 3, G-AKNU, on November 15, 1957, is an impeccable document. Unfortunately, the final clue to the cause of the accident will never be known.

Everything is, however, known except the reason for the operation of the cut-off actuator for No. 3 engine (starboard inner). The loss of power from this engine was, following the feathering of No. 4 engine (starboard outer), the cause of the failure to maintain or to gain height and, possibly, to retain control.

The Solent took off from Southampton Water in a northwesterly direction at 22.46 hrs., turned normally on the course (190° M) and maintained this course until, or just before, crossing the Hampshire coast, south of Beaulieu.

At about 22.54 hrs. a message was sent saying that No. 4 engine had been feathered and that the aircraft was returning to base. The crash occurred at about 22.55 hrs. on the face of a quarry between Chessel and Brook in the Isle of Wight. The evidence shows that No. 4 was feathered when or before crossing the Hampshire coast; that a turn to port, for a return to Southampton Water, was initiated; that power was lost from No. 3, causing the aircraft to start a turn to starboard; and that this slow turn continued until the crash.

The Accidents Investigation Branch of the M.T.C.A. established the following facts: (1) At the moment of impact the Solent was banked 45° to starboard; (2) only the port engines were then under power; (3) the propeller of No. 3 was windmilling and that of No. 4 was feathered; (4) the speed at impact was at or near the stall; (5) there was no mechanical defect in any engine; and (6) the fuel cut-off actuators for both the starboard engines were in the closed position. The reason for this last fact remains the crucial and unsolved question.

Many possibilities are discussed in the report, but none of them seem to be very acceptable. An accidental electrical cause would have involved three separate failures. The engine power failures did not apparently occur at the same moment, so the accidental tripping of both cut-off switches (which had guards) seems unlikely. It was possible for the cut-off switches to be operated instead of the pitot-head heater switches, but these would normally have been tripped before take-off and would, in any case, have been switched on together.

The least unlikely suggestion was one offered by the Assessors at the Inquiry. This was to the effect that the wrong (No. 3) cut-off switch might have been tripped after feathering No. 4 and that, in a quick re-check when trouble was obviously developing, the switch for No. 4 was moved to "stop"—leaving both in that position.

## Impressions of the Caravelle

A RIDE in the second prototype Caravelle last week provided, at one and the same time, a reminder of the past and a foretaste of the future. The past, from the days of the Comet 1, was remembered in a pleasurable re-experience of turbojet travel, and the future was pre-tasted in an aircraft which set the new fashion and is the first to have its turbojet powerplants grouped at the rear.

Many of the passengers flown during Air France's demonstrations with the Caravelle from London Airport and, later, from Ringway and Prestwick, last week must have been enjoying their first flight in a turbojet transport since the days of the Comet. They will have remembered something of their earlier experiences—and particularly the impression of smooth motionlessness during the cruise above cloud. They will also have learnt how the rear-fuselage mounting of the engines can even further lower the levels of noise and very minor vibration.

The Caravelle is a very delightful aeroplane and, at least in this particular prototype, almost the only complaint which can be offered by the passenger concerns the somewhat excessive noise of the air conditioning system—a complaint which would not be taken seriously in any but a turbojet-powered aircraft. The near-unreality of the Caravelle experience begins when the Avons are started up and one is actually, for a moment or two, uncertain whether the new noise and the very slight vibration are from one's own or from some other aircraft nearby on the apron. Even during the build-up of thrust on the brakes and during the take-off it is possible to carry on a normal conversation. Then and on the first part of the climb the passengers in the rear of the aircraft may be just conscious of an intake whistle, but there is no other specific engine noise to be distinguished.

The take-off is most impressive. At V2 speed—reached, on

Last week the Caravelle, in its second prototype form, paid a first official visit to England on a demonstration tour sponsored by Air France. This picture was taken at L.A.P.

*Photograph copyright "The Aeroplane"*

This air-to-air view of the Caravelle shows off its significant features—rear-mounted engines and aerodynamically clean wing. The first production Caravelle for Air France has flown 200 hours in the past two months.

this flight, in 29 seconds from brakes-off—the aircraft is rocked into the take-off attitude and climbs cleanly away at about 2,000 ft./min. Perhaps more impressive still is the descent and approach technique, using the airbrakes, which permit a routine rate of descent of 4,000-6,000 ft./min. and emergency rates up to about 11,000 ft./min.

During our flight, which involved a short period of holding over the Watford range, the entire descent, pattern-flying and final approach appeared to be made at constant power-setting, using the airbrakes from time to time to adjust the speed or to make a descent through the stack. The final powered approach, with flaps extended, ended with a brief application of the air-brakes to kill the speed as we crossed the threshold.

There is very little variation in the noise level throughout the cabin. The rear seats are obviously slightly less quiet than those at the forward end of the fuselage, where almost complete peace would prevail if there was no noise from the air-conditioning system. Curiously, the control cabin of the Caravelle does not appear to suffer from the "air-rush" noise experienced in the early Comet—yet the nose of the Caravelle is, in fact, almost identical in design and layout with that of the Comet 1.

The retractable rear-entry stairway is an attractive feature, and should, if the forward door is used by the passengers who are leaving the aircraft, reduce turn-round times. Such a stairway is made practicable in that the rear of the aircraft in any case needs to be of stiffer construction than usual because of the engine position. A criticism of the system is that this doorway is likely to be jammed in a wheels-up or crash landing; passengers would then need to use the over-wing window emergency exits and/or the two forward doors—that on the starboard side being an emergency and service exit.

This second prototype Caravelle, F-BHHI, is, in fact, the aircraft which made the 30,000-mile tour of North and South America last year and is laid out with 56 first-class seats. Production aircraft will be laid out for 64 first-class, or 80 tourist passengers, or with a mixed-class arrangement. The first production aircraft for Air France flew on May 18 and has already put in some 200 hours flying. The demonstration flights in England last week with the second prototype were handled by Air France with an airline crew led by Capt. G. Rivière, chief pilot of the company's European operating division.

# Points from B.O.A.C.'s Report

IN last week's issue (page 162) we outlined the basic facts of the results obtained by B.O.A.C. during the financial year which ended on March 31. The breakdown of some of the figures on the next page provides a more detailed picture of these results compared with those for the previous year.

In general terms it can be said that the failure to do better was caused primarily by a reduction in available business during the second half of the year, coupled with a number of other factors. The overall deficit was also quite considerably increased by the losses incurred by associated and subsidiary companies—mainly those in the Western Hemisphere.

The drop in business is explained in the report as being noticeable from October, 1957, onwards. Revenue remained generally as forecast, except on the eastern routes, for the first six months of the year, but from then on the fall in the prices of primary commodities and the North American business recession affected the amount of traffic to an increasing degree. The West Atlantic local services between New York and the Caribbean were seriously affected by the reduction in holiday travel from the United States.

The overall effect was that a weight load factor of only 60.5% was achieved, by comparison with an estimate of 64.4% and with the 1956-57 figure of 63.7%. The load factor appears to have been held at around 64% until July, 1957, when it began to drop more and more steeply.

The effect of the delays in the delivery of Britannias obviously cannot be measured in a profit and loss account. The facts are described in the report in the following words:

"These aircraft, of both series, by virtue of their size, speed, range and quietness have very considerable passenger appeal and are attracting good loads in spite of the drop in traffic offering. It is unfortunate, therefore, that their introduction into service has been seriously affected by late delivery from the manufacturers with the result that out-moded types due for retirement had to be continued in the service of the Corporation after their effective competitive lives in front-line service had declined. This situation has contributed in no small measure to the adverse results of the year, during which delivery of the medium-range Britannia 102 fleet was completed and all the aircraft of this type are now in service. We are glad to be able to report that deliveries of new Britannia 312 aircraft, though still behind schedule, are now coming along well and enabling us gradually to retire our more obsolete types."

The report also referred to the loss of cabotage rights on some services and to the effect of competition from Airwork and Hunting-Clan on the African services.

Of the first matter, the report remarks that until recently British cabotage rights have entitled the Corporation to operate services to cater for the whole of the first-class and tourist traffic available for carriage between the U.K. and U.K. territories in Africa. As a consequence of the emergence of independent states in the place of the former colonies, B.O.A.C. has lost its position as sole operator. The Corporation has offered to place its experience on the routes at the disposal of the national airlines of the new states and, in certain instances, partnership arrangements have been concluded.

Of Colonial Coach service competition the report says that a factor which adversely affected the year's results was the permission given to the British independent companies to operate these services with Viscounts. The Corporation was obliged to continue to operate tourist-class services to various points in Africa with Argonauts and the competition from the new and faster Viscount services, operating at the lower fares authorized for Colonial Coach services, was keenly felt. Although such services were designed to cater for a new class of traffic, they have, the report states, "caused increasing inroads into the traffic carried on the tourist services of the Corporation and its partners."

A minor cause of financial loss was the delay in the introduction of the higher fares which were recommended by IATA and resisted by the United States C.A.B.

Although the operating expenditure under the heading of

**TRAFFIC RESULTS COMPARED**

| 1956-57 | | 1957-58 |
|---|---|---|
| 282,134,827 | Usable capacity ton-miles flown | 329,735,088 |
| | Revenue load ton-miles flown: | |
| 120,354,858 | Passenger | 131,872,143 |
| 1,950,188 | Excess baggage | 2,064,815 |
| 20,131,600 | Mail | 20,201,328 |
| 299,875 | Diplomatic bags | 268,541 |
| 32,439,413 | Commercial freight | 35,238,327 |
| 182,378,888 | Total revenue load ton-miles | 206,091,772 |
| 63.7 | Revenue load factor (%) | 60.5 |
| 1,817,464,853 | Available seat-miles flown | 2,094,803,488 |
| 1,254,744,184 | Revenue passenger-miles flown | 1,417,685,598 |
| 66.0 | Revenue seat utilisation (%) | 63.3 |
| | Aircraft miles flown: | |
| 39,477,707 | Revenue | 42,559,245 |
| 3,112,183 | Non-revenue | 4,476,594 |
| 42,589,890 | Total | 47,035,839 |
| | Load carried: | |
| 409,684 | Revenue passengers | 480,344 |
| | Other load (tons): | |
| 856.3 | Excess baggage | 914.0 |
| 4,145.4 | Mail | 4,102.7 |
| 67.1 | Diplomatic bags | 61.1 |
| 7,483.8 | Commercial freight | 7,981.9 |
| 12,552.6 | Total | 13,059.7 |
| | Expenditure and revenue: | |
| 63.9d. | Traffic revenue per load ton-mile | 61.8d. |
| 41.3d. | Traffic revenue per capacity ton-mile | 38.6d. |
| 39.6d. | Operating costs per capacity ton-mile | 38.7d. |
| 24s. 7d. | Traffic revenue per revenue-mile | 24s. 11d. |
| 23s. 7d. | Operating costs per revenue-mile | 25s. 0d. |
| 6.5d. | Passenger revenue per passenger-mile | 6.4d. |
| 63,418 | Unduplicated route mileage | 65,918 |

Tons are short tons of 2,000 lb.

"Technical Training and Development" was, in fact, no greater than that for the previous year, there is certainly a good case for the Corporation's suggestion that development and service-introduction costs for new aircraft should not have to be borne directly.

Such costs are amortized over a period of years, but the figures are startlingly high when quoted in bulk. An analysis of expenditure shows that of the total of £4,376,743 which was carried forward in the accounts for future amortization, a figure of £2,653,462 is put against the Britannia and £784,096 against the Comet. The report states the Corporation's views in these terms:

"B.O.A.C. has been subject to the disadvantage of carrying an exceptional burden of expense and responsibility whenever they have been called upon to introduce a new British type of aircraft into service. It has fallen to the Corporation since the war to eliminate the teething troubles of successive types of long-distance British transport aircraft. There is no other country in the world which expects its airlines to bear the additional expense entailed by this work of developing a new aircraft to make it fit for competitive service and for export.

"The Corporation considers that it should be afforded some form of financial assistance, at least for its service to the wider national interests of the export markets if not in satisfaction of its legitimate claim to compensation for the additional costs which it has to bear compared with its competitors. It is recognized that this question forms part of the wider issue of the financial provision to be made in future for research and development of civil aircraft types.

"As a potential user of the future products of the British aircraft industry, the Corporation ventures the opinion that an adequate proportion of the savings under the Defence programme on research and development for the Services should continue to be devoted to civil projects. If this country is to be able to maintain the important contribution which aircraft exports have made in recent years to our balance of payments, savings at the expense of essential research and development could become expensive."

Another cause for complaint in the report concerns the fact that the Corporation has to pay interest on its capital whether or not a profit is made, whereas many other airlines have their capital in equity form which does not involve payment of dividends unless profits are made. We might add here that the average interest rate paid by the Corporation, though higher now than in previous years, is still only about 4%—a low figure by any standards.

This might be a good moment to introduce a complaint of our own. Although the reports of our two British airline corporations are among the most complete of their kind in the business, B.O.A.C.'s does not give the detailed information necessary for the outsider to understand exactly what has been happening during the year under review. B.E.A.'s report is more thorough and gives, in particular, a most useful breakdown of the results obtained with each type of aircraft in its fleet. Such a breakdown would help in an understanding of some of B.O.A.C.'s problems. In the same way, it would be more than useful if the results could be broken down according to routes or areas.

A number of interesting points emerged during the Press conference which preceded the publication of the report last week.

There is, for instance, a possibility that—as suggested at the time when Northeast Airlines deferred the purchase of Britannias last year and before this order was positively cancelled—B.O.A.C. might make use of the remaining three of this fleet of 305s. They would not be bought but leased, since the Corporation is presumably unwilling, at this stage in its fleet development, to take over more turboprop aircraft. The Britannias are obviously doing extremely well pending competition from the turbojets of the near future. At present they are enjoying better than 90% load factors eastbound on the Atlantic and better than 80% westbound. These figures are considerably higher than those quoted for piston-engined aircraft flown by the Corporation and by other operators.

Because of their big investment in turbojets, B.O.A.C. is not prepared to favour the idea of fare-differentials by type—a fact which does not improve the prospect that such differentials may be agreed by IATA members, though B.E.A. may press for them in Europe.

B.O.A.C. is not likely to attempt to dispose of their DC-7Cs until the Boeing 707s start to come into service in December, 1959. Meanwhile, however, the prices of piston-engined long-haul aircraft will be dropping, so there may be a change of decision before that date. One of the problems for the Corporation is that aircraft which have been bought for dollars must, if possible, be sold for dollars. This need for dollar sales is holding back the disposal of the 749s. At the end of the financial year there were four 749s, two DC-4Ms and one Hermes for disposal. Six 749s were still in service and six had been sold during the year. The amortization rates for the Stratocruisers have been adjusted so that their residual value next year will be that which Boeing will pay for them in the turn-in deal for the 707s.

Traffic results and bookings show that the new economy class is doing well on the Atlantic—and eating into tourist sales. It seems likely that the new class may cause the tourist class to vanish. Extensions to the areas in which the economy-class fares apply will be discussed at the September traffic conferences of IATA.

The introduction of bigger-capacity aircraft, such as the 707s, is going to add to the difficulties of the city-centre-to-airport transport problem. B.O.A.C. is strongly of the view that road transport must give way to rail transport as soon as possible—road improvements notwithstanding.

**THE FINANCIAL RESULTS IN BRIEF**

| | 1957/58 £ | 1956/57 £ |
|---|---|---|
| Total revenue | 53,526,375 | 49,004,711 |
| Total expenditure (excluding losses on Associated companies and interest on capital) | 53,397,253 | 46,460,789 |
| Profit on Corporation's operations | 129,122 | 2,543,922 |
| Loss on Associated companies operations | 590,748 | 767,395 |
| Interest on capital employed on current operations | 2,377,724 | 1,472,675 |
| Result after remuneration of capital | 2,839,350 (loss) | 303,352 (profit) |
| Percentage increase in capacity produced over previous year | 18.6% | 10.8% |
| Cost per unit of output | 38.7d. | 39.6d. |
| Percentage increase in traffic revenue over previous year | 9.2% | 14.5% |
| Average overall load factor | 60.5% | 63.7% |
| Average passenger load factor | 63.3% | 66.0% |

**Capital**

At March 31, 1958, the total borrowings of the Corporation amounted to £109,770,202, made up as follows :—

| | £ |
|---|---|
| British Overseas Airways Stock | 59,255,917 |
| Exchequer advances | 41,085,714 |
| Bank loans | 9,428,571 |
| | 109,770,202 |

These borrowings were used as follows :—

| | £ | 1957/58 % | 1956/57 % |
|---|---|---|---|
| Capital employed on the Corporation's current operations | 64,756,943 | 59.0 | 64.9 |
| In Associated and Subsidiary companies | 11,912,342 | 10.9 | 7.2 |
| | 76,669,285 | | |
| Progress payments for future aircraft | 33,100,917 | 30.1 | 27.9 |
| | 109,770,202 | 100 | 100 |

# THE FIGHTING SERVICES

## The R.A.F. "At Home"

THIS year 35 R.A.F. stations in the United Kingdom are to be open to the public on Saturday, September 20, as part of "Battle of Britain" week. Five V-bomber bases—Cottesmore (Rutland), Marham (Norfolk), Gaydon (Warwickshire), Waddington (Lincs), and Honington (Suffolk)—are included in the total.

R.A.F. Biggin Hill, the only station near London to be open, is planning a programme comparable with its displays of past years, which have attracted more than 200,000 people. At Acklington (Northumberland), Horsham St. Faith (Norwich), and Leuchars (Scotland) Javelins as well as Hunters will be on view. Other units to be open to the public include the Aircraft Apprentice School at Halton (Bucks), the Boy Entrant training schools at St. Athan (Glamorgan) and Cosford (Staffs), and Valley (Anglesey), the base of the Guided Weapons Development Squadron.

As in past years, admission will be free and the proceeds from car parking and programme sales will be shared by the R.A.F. Association and the R.A.F. Benevolent Fund. Last year 1,079,880 people attended the "At Home" day.

## Service Recruiting

PUBLISHED by the Ministry of Defence last week, recruiting figures for the three Services in June showed that the R.A.F. obtained 2,448 recruits as compared with 1,328 in June of last year. In terms of man-years the comparison was 18,500 and 10,300 respectively. The numbers entering the Service on engagements of nine years or longer were 213 above the average (306) for the previous 12 months.

## Auxiliary Fighter Control

FIVE of the R.Aux.A.F. fighter control units are to be disbanded on October 15 and the future of a sixth is uncertain. The units standing down are No. 3507 (County of Somerset) F.C.U.; No. 3602 (City of Glasgow) F.C.U.; No. 3608 (North Riding) F.C.U.; No. 3500 (County of Kent) F.C.U. and No. 3701 (County of Sussex) F.C.U.

No. 3603 (Edinburgh) F.C.U. is being retained for the time being as it may be required in a new rôle associated with the war operations of Headquarters, No. 18 Group, Coastal Command. A decision by the Air Minister on this unit is expected soon. Announcing the disbandments, Mr. George Ward added that the Control and Reporting system changes as new equipment and techniques are introduced, but the present reorganization of auxiliary fighter control units is now complete.

## R.C.A.F. Aircrew Training

A CEREMONY at R.C.A.F. Winnipeg on July 19 marked the termination of the R.C.A.F.'s original NATO Aircrew Training Plan. Since it started in late 1950, the plan has seen more than 5,000 pilots and navigators from 10 other NATO countries trained in Canada. Approximately 200 trainees are still undergoing instruction and the last of these are expected to graduate in December.

Under separate arrangements which replace the original plan, some training by the R.C.A.F. is continuing for limited numbers of aircrew from Norway, Denmark and the Netherlands. In addition, pilots are being trained in Canada for the German Air Force under a similar agreement.

*Photograph copyright "The Aeroplane"*

CRANWELL GRADUATION.—General Lauris Norstad, Supreme Allied Commander, Europe, was the reviewing officer at the passing out parade of No. 73 Entry of flight cadets at the R.A.F. College, Cranwell, on July 29. The Parade Commander, S.U/O. A. E. Thomson received the Sword of Honour and the Queen's Medal was awarded to U/O. M. E. Bee.

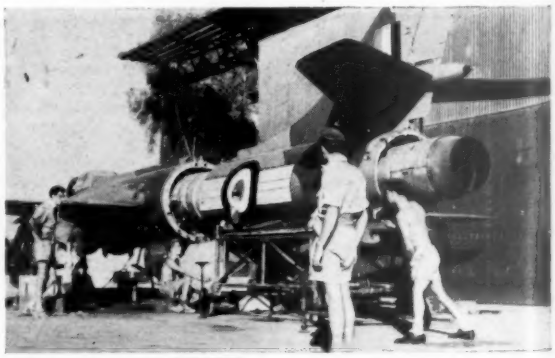
## R.A.F. Appointments

THE following are among recent Royal Air Force appointments:—

**Group Captain:** W. J. Stutchbury to No. 2 Stores Depot, R.A.A.F., to command, under the exchange scheme.

**Wing Commanders:** E. B. O'H. Bennett to R.A.F. Scharfoldendorf for signals duties; W. T. Dunlop, O.B.E., to R.A.F. Oakington for technical duties; A. G. Evans to Headquarters, Home Command, for technical staff duties; J. W. Louw, O.B.E., D.F.C., to Air Ministry for duty in the Department of the Air Member for Personnel; G. H. Melville-Jackson, D.F.C., to R.A.F. West Raynham to command the All-Weather Wing; E. T. Tucker to Headquarters, No. 90 Group, for technical staff duties.

**Squadron Leaders:** R. C. Everson, A.F.C., to R.A.F. Tern Hill for administrative duties (with acting rank of Wg. Cdr.); D. Roberts, D.F.C., A.F.C., to Headquarters, Bomber Command, for operations duties (with acting rank of Wg. Cdr.); J. C. W. Weller, D.F.C., to R.A.F. Ballykelly to command No. 204 Sqn. (with acting rank of Wg. Cdr.).



AMMAN ACTIVITY.—Above, a M.E.A.F. Hunter 6 of No. 208 Squadron undergoing servicing at Amman. Left, probably the largest number of Beverleys ever recorded by camera, which was obtained during the recent airlift of the 16th Independent Parachute Brigade to Jordan.

# Saro's First Turbine Helicopter

A NEW climate in the aircraft industry has made many companies realize that they face a difficult future and possibly even a battle for survival. Saunders-Roe, Ltd., is one which has reacted vigorously to a recent misfortune. The company received a bitter blow in December, 1957, when the development of its P.177 mixed-powerplant interceptor was ended.

Saunders-Roe responded by deciding on January 1 this year to build a new five-seat light helicopter as a private venture. Much effort has gone into the design and construction of this aircraft, the P.531, which made its first flight less than seven months later—on July 20, 1958. Few, if any, modern helicopters can have been built so quickly; initial development schedules today are usually reckoned in years rather than months.

### Design Aims

In designing the turbine-powered P.531 Saunders-Roe aimed to produce a small, compact helicopter which would carry five people, and would be suitable for world-wide operation with a good performance even at high altitude and in very hot conditions.

The P.531 is primarily intended for use as a military helicopter. Although this aircraft has not been designed to an existing specification, the company has had informal discussions about it with all three British Services.

For this reason the P.531 has been designed to operate in a variety of military rôles—for liaison, air/sea rescue, casualty evacuation or reconnaissance, or as a light freighter, trainer or weapon carrier. It is equally suitable for a range of civil uses.

Discussions on the P.531 have assured Saunders-Roe that the basic concept of the helicopter is correct. At the same time the company has not been bound by the close requirements of a rigid specification. This has contributed to the aircraft's rapid development—prototypes have been built quickly, so that the basic functioning of the helicopter can be proved. But it has been unnecessary for detailed military equipment to be installed in these prototypes, and the corresponding freedom of action has accelerated progress.

Saunders-Roe approached the design of the P.531 with the feeling that current five-seat helicopters were unnecessarily large and expensive. Its studies showed that size and weight could be reduced considerably if turbine power were adopted at the initial design stage. The specific weight of turbine engines is very low and enables considerable savings to be made. Comparable turbine and piston powerplants for the P.531 would weigh 0.714 lb./h.p. and 1.67 lb./h.p. respectively—for a given power the turbine engine weighs less than half as much as the piston engine.

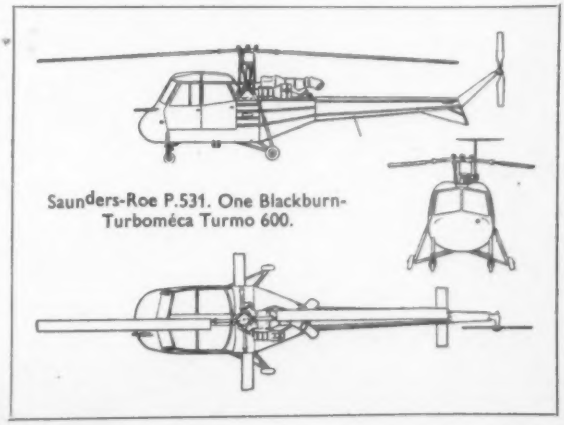
Because turbine power could be installed much more cheaply from the weight point of view than piston-engine power, the rotor diameter was kept small. This meant some slight sacrifice of rotor efficiency, which could easily be accepted as the additional power needed by the rotor could be supplied economically from the weight viewpoint by a turbine engine. By keeping diameter down a great saving was made in rotor weight and, what is more important, in the efficiency of the rotor system as such.

Thus the P.531 follows the current helicopter trend towards higher rotor disc-loadings. This is analogous to the increase in wing loading of fixed-wing aircraft over the years as engines have improved in specific weight and power output.

On the P.531 the rotor diameter of the Skeeter has been retained, but a four-bladed rotor has been adopted. This has been decided because of the greater all-up weight of the P.531—for a given rotor diameter and acceptable blade loading the correct way to increase the lifting capacity of the rotor was to step up the number of blades.

Other advantages stem from an increase in the number of blades. The maximum speed of helicopters tends to be limited by the vibration level of the rotor. As the number of rotor blades is increased, the higher-order vibration level is lowered and forward speeds can be greater before a vibration limit is reached. This has important implications for a turbine helicopter as the specific fuel consumption of a turbine engine is lowest at high power outputs. Hence the turbine helicopter has its maximum range when flown at high power and thus fast. Its limiting speed, therefore, should if possible be dictated only by engine power and not by rotor vibration. It is intended that the P.531 should cruise at 110 m.p.h.—a speed made possible by its four-bladed rotor.

By adopting turbine power for the P.531 Saunders-Roe has produced a five-seat helicopter which in overall dimensions is



Saunders-Roe P.531. One Blackburn-Turboméca Turmo 600.

GOOD VIEW.—This from-the-cockpit shot shows the excellent all-round view that is provided for the occupants of the new Saunders-Roe P.531 helicopter.

similar to the two-seat Skeeter, except that the P.531 is some 2 ft. 6 in. longer. Its cabin, of course, is very much larger.

The use of a free-turbine engine is considered to be a big advantage by the makers. It simplifies engine installation, as a clutch is unnecessary, and gives flexibility of operation without the overheating difficulties which have been a practical drawback of fixed-shaft turbine engines in helicopters. Progressive development of the engine installation is planned for the P.531. Details are given below. In this respect it will compare with the Skeeter, which has had in succession Jameson, Blackburn Cirrus Bombardier and D.H. Gipsy Major engines.

The P.531 is in no way a larger version of the Skeeter, but it does represent a logical development and embodies much experience gained with it. The rotor and control system are based on those of the Skeeter. Apart from this relationship, only one major component, the tailboom, has been taken over, in modified form, from the smaller helicopter. In other cases minor Skeeter parts have been used; as for example, the front wheels of the Skeeter four-wheeled undercarriage.

### Development Time-scale and Plans

Project design of the P.531 was finalized at the Eastleigh factory in November last year. On January 1, 1957, the decision was taken to go ahead with three prototypes. Detail design began immediately, and a mock-up was completed in February. Ground running of the first prototype began on June 19, only 5½ months after detail design began. Twelve hours of ground running were completed in five days.

The first two prototypes have Blackburn Turmo engines de-rated at 300 s.h.p. The aim has been to build these prototypes as rapidly as possible so that they can be used to prove the basic concept of the helicopter. Flight tests with them will prove the engine installation and rotor and flying-control systems. So far as detail equipment is concerned, these prototypes may not be representative of production aircraft—in the Saunders-Roe view much time is wasted by burdening unproven prototypes with the equipment and detail requirements of production aircraft.

The third P.531, which should fly in February, 1959, is to be the prototype of the Mk. 1 production helicopter. As such it will have a fully rated Turmo engine, with a 400-s.h.p. 1-hr. rating, and will be equipped to Service standards.

The airframe and transmission/rotor systems have in fact been designed to accept powers up to 650 s.h.p. This built-in development potential will allow the aircraft to be fitted in due course with a power unit in the 800-1,000 h.p. class.

If such an engine were installed it would be de-rated to give some 600 h.p. for temperate operation, but its reserve power would ensure that a 600-s.h.p. output was maintained even in very hot, high-altitude conditions. In effect the performance of the helicopter would be virtually independent of climatic and geographic conditions.

Engines which might well prove suitable in this rôle are the D.H. Gnome, which is a license-built General Electric T58, or the shaft-turbine engines under development such as the Blackburn A.129, the Armstrong Siddeley P.181, and the Napier Gazelle Junior E.222. But for the present production P.531 helicopters will rely on the type-tested Blackburn Turmo 600.

### Structure

The structure of the P.531 fuselage is designed for versatility of cabin layout. The forward section includes the cabin, fuel-tank bays and engine-support structure; the rear section or tailboom is built as a separate unit and carries the tailplane and tail rotor.

The forward section is built around a spinal girder which runs under the cabin floor and acts as a base for the engine mountings. Fuel-tank bays for three bag tanks holding in all 126 Imp. gal. are behind the cabin and immediately beneath the centre of the main rotor. As a result there is no variation of the C.G. as fuel is used.

All the load-bearing structure of the cabin is beneath the floor and the cabin walls and roof act merely as fairings; they do not form part of the stressed structure. This makes it possible to alter the cabin size to suit different requirements. The canopy structure is built up of sheet skinning on a light welded-tube frame.

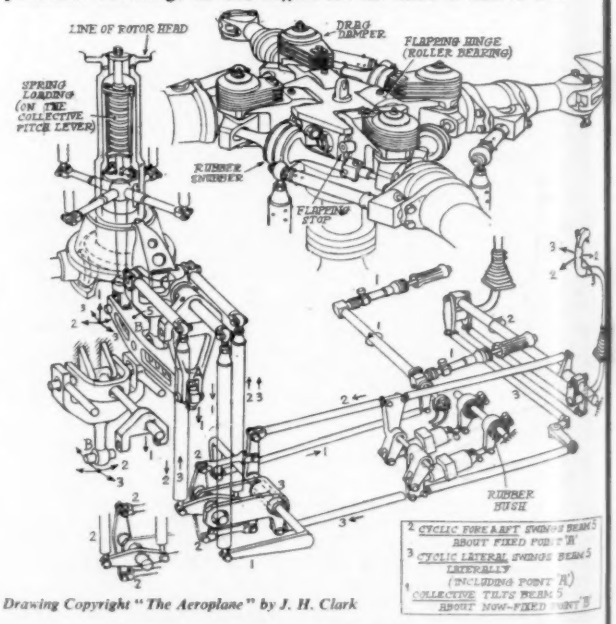
Advantages of this type of construction are seen in the prototypes, which have large doors that can be removed for air/sea rescue work.

For rescue, a lightweight hoist operating on compressed air tapped from the engine is fitted on the starboard side of the fuselage. External loads can be carried in slings or in a cargo net by attaching cable straps underneath.

The first prototype has a conventional four-wheel undercarriage, which is interchangeable with a tubular-skid unit. There was a thorough analysis of the ground resonance problem and investigations were made with detailed impedance tests, an analogue computer analysis, and a dynamic model, which was tested at the College of Aeronautics. As a result of these studies no major difficulties were expected, or have been experienced to date during extensive ground running or subsequent flying.

### Engine and Transmission

The Turmo 600 free-turbine engine is mounted on a platform behind the cabin, and is uncowled for ease of access. A particular advantage of this engine for all users is that it will


LINE OF ROTOR HEAD
DRAG DAMPER
FLAPPING HINGE (ROLLER BEARING)
SPRING LOADING (ON THE COLLECTIVE PITCH LEVER)
RUBBER SNUBBER
FLAPPING STOP
RUBBER BUSH
2 CYCLIC FORE & AFT SWINGS BEAM 5 ABOUT FIXED POINT 'A'
3 CYCLIC LATERAL SWINGS BEAM 5 LATERALLY (INCLUDING POINT 'A')
4 COLLECTIVE TILTS BEAM 5 ABOUT NOW-FIXED POINT 'B'

*Drawing Copyright "The Aeroplane" by J. H. Clark*

Control system and rotor head.

operate on low-octane petrol, kerosene or light Diesel fuel. It requires no warming-up period.

As no clutch is needed, engine transmission is simple. An integrated gearbox which includes both Blackburn and Saunders-Roe components, has been developed. In this the maximum 32,000 r.p.m. output from the free turbine is reduced via helical pinions to 6,000 r.p.m. and then to 2,000 r.p.m. through a pinion driving a spur gear which has a free-wheel unit integral with it.

The shaft from this gearbox transmits power at approximately 2,000 r.p.m. direct to the tail rotor on one side; on the other the drive passes via a spiral bevel pinion to a crown wheel attached to the main rotor shaft. The speed of the main rotor can vary between 320 and 360 r.p.m., with the corresponding variation of free-turbine speed.

Approximately 8% of the total power is taken by the tail rotor. The shafting along the tail-boom to this rotor passes through angle and tail gearboxes.

Accessories driven by the engine are a generator, an oil pump, a tacho-generator, and a vacuum pump for the blind-flying instruments. There is also a double-pulley belt-drive to the fan of the twin gearbox and turbine oil-coolers, which are mounted beside the engine. An electric starter motor is also fitted.

Free-turbine speed, and thus rotor speed, is controlled by a full-authority governor with a pre-select facility. This allows the pilot to choose the most suitable rotor speed for any flight condition; the governor ensures that this rotor speed is maintained by varying engine power to meet the demands of the rotor. Any rotor speed within the operating range can be selected and full engine power can be utilized at any of these speeds.

The pilot has two engine controls: a rotor-speed selector and a twist-grip on the collective-pitch lever. The twist-grip has two positions—" idle " and " power." When at " power " the governor controls the engine power to give the desired r.p.m. If there is a failure of the governor it will automatically be by-passed and the twist-grip then acts as a normal throttle control. The twist-grip is mechanically linked to the main fuel valve.

### Rotors and Flying Controls

The P.531 has the classic configuration of a single main rotor with a tail rotor for torque compensation and to provide yaw control.

There are no power controls on the P.531; the aim is to achieve handling properties similar to those of the Skeeter, which also has manual controls. Flying-control properties of the P.531 depend entirely on its hub design. The flapping hinges are offset in two directions—radially, to give adequate moments for rapid control response, and tangentially, to avoid uneven loading of the flapping-hinge bearings.

All-metal rotor blades are available for the Skeeter and these can be used on the P.531, but it is expected that Mk. 1 production aircraft will have Hordern-Richmond composite-construction blades. The real requirement is for blades suitable for all climatic conditions; Saunders-Roe is not convinced that all-metal blades are essential. The company feels that blade life should be at least 1,000 hr. when a helicopter enters service; the life of Skeeter blades was 1,600 hr. when it went into service.

The composite rotor blades have a main body of spruce, a leading-edge unit of birch, with a steel balance bar passing through it, and a trailing-edge portion of balsa. A stainless-steel strip is bonded around the leading-edge and the rest of the surface has a glass-fibre surface coating.

Metal blades are under study by the company. One type examined has a solid spar and surface skins which are chemically milled and taper in thickness towards the trailing-edge. The skins are bonded to the spar and stabilized by a filling of metal honeycomb bonded to them. The skins are bonded together where they meet at the trailing-edge.

The tail rotor is twin-bladed and of the same diameter as the Skeeter's; but for the new helicopter non-tapered greater-chord blades are used.

The P.531 has conventional cyclic control, and electric trimmers are fitted. There is also an adjustable tailplane, which can be trimmed in flight by an electric actuator controlled by the pilot. Control design permits unrestricted loading of the cabin for normal operations and ballasting is unnecessary. An auto-stabilizer and autopilot can be installed if required by the operator.

The cabin of the prototypes (about 5 ft. wide, 5 ft. 8 in. long and 4 ft. high) is surprisingly large for such a relatively small helicopter. There are two single seats at the front and a bench seat for three passengers aft. This rear seat folds flat against the bulkhead to give a clear floor space for freight. As an ambulance two stretchers can be carried with the medical attendant in a reversible front seat beside the pilot.

There are dual flying controls in the first prototype, with a single set of flight instruments. An excellent field of vision is given by large and wide flat glass windscreen panels, which have wipers and, if required de-icing panels. Roof and side-window panels are of Perspex.

### Maintenance

Although helicopters are inevitably complex and at present expensive to operate, in the Saunders-Roe view cost results from insufficient study at the design stage of access and maintenance needs. These features have been closely watched during P.531 design, and it is claimed that every important component can be reached within 20 sec.

The engine and transmission are uncowled and can easily be removed from the airframe. The strong flat surface behind the cabin acts as a maintenance platform; when a mechanic stands on this the rotor hub is easily accessible and at his shoulder level.

Flying controls and electrics are reached through large hinged panels at cabin-floor level. The battery and fuel-system components can also be examined rapidly.

The P.531 is a fascinating aircraft which in its developed form should have a performance which puts many larger helicopters to shame. If its development continues as rapidly as it has begun, its success seems assured.—J.R.C.

### TECHNICAL DATA

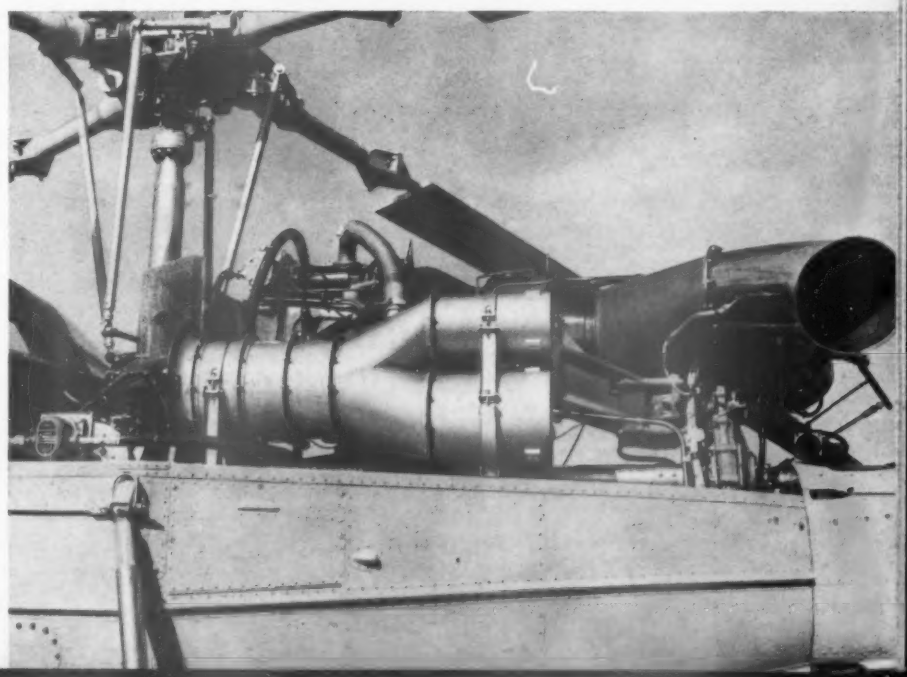
**Dimensions.**—Main rotor diameter, 32 ft. 6 in.; tail rotor diameter, 6 ft.; overall length, 29 ft. (main rotor blades folded); overall width, 8 ft. 6 in. (main rotor blades folded); overall height, 9 ft. 6 in.

**Powerplant.**—One Blackburn Turmo 600 free-turbine engine: 400 s.h.p. 1-hr. power rating.

**Fuel Tankage.**—Normal, 126 Imp. gal.; long range, 186 Imp. gal.

**Weights.**—Empty, 2,092 lb. (fully equipped less radio); normal all-up weight, 3,800 lb.; disposable load, 1,708 lb.

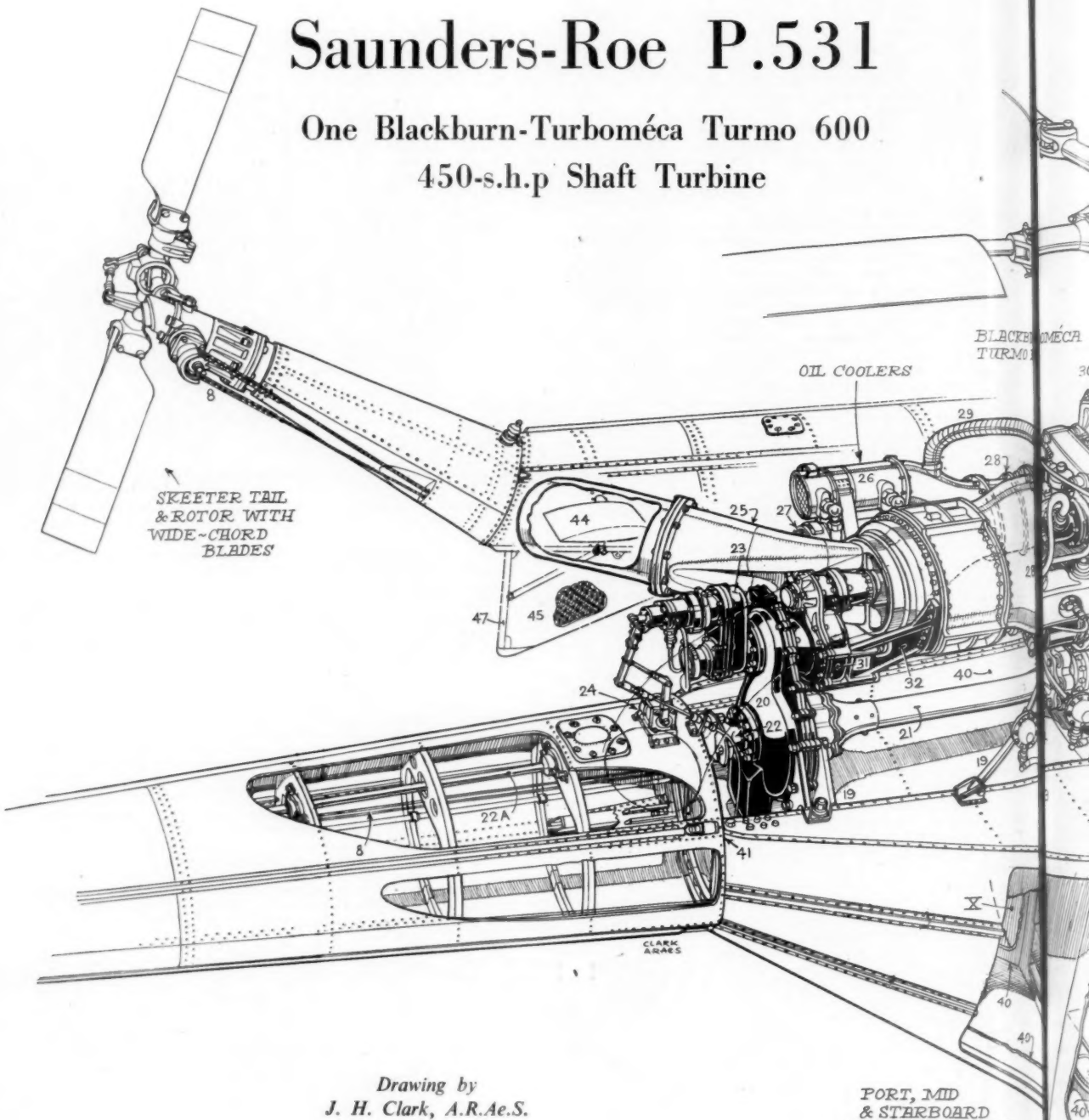
**Performance.**—Cruising speed, 100 knots; max. speed, 105 knots; max. range, 210 n.m. (with normal tankage); max. endurance, 3.3 hr. (with normal tankage); max. range, 280 n.m. (with long-range tankage); max. endurance, 5.2 hr. (with long-range tankage); vertical rate-of-climb at sea-level in I.S.A. conditions at 3,800 lb. all-up weight, 540 ft./min.; hovering ceiling at 3,800 lb. all-up weight in I.S.A. conditions, 2,300 ft.



ACCESSIBILITY.—By mounting the Blackburn Turmo free-turbine powerplant on top of the fuselage and leaving it uncowled, the maximum of accessibility is obtained and the side platforms can be used as servicing stands for the rotor head.

# Saunders-Roe P.531

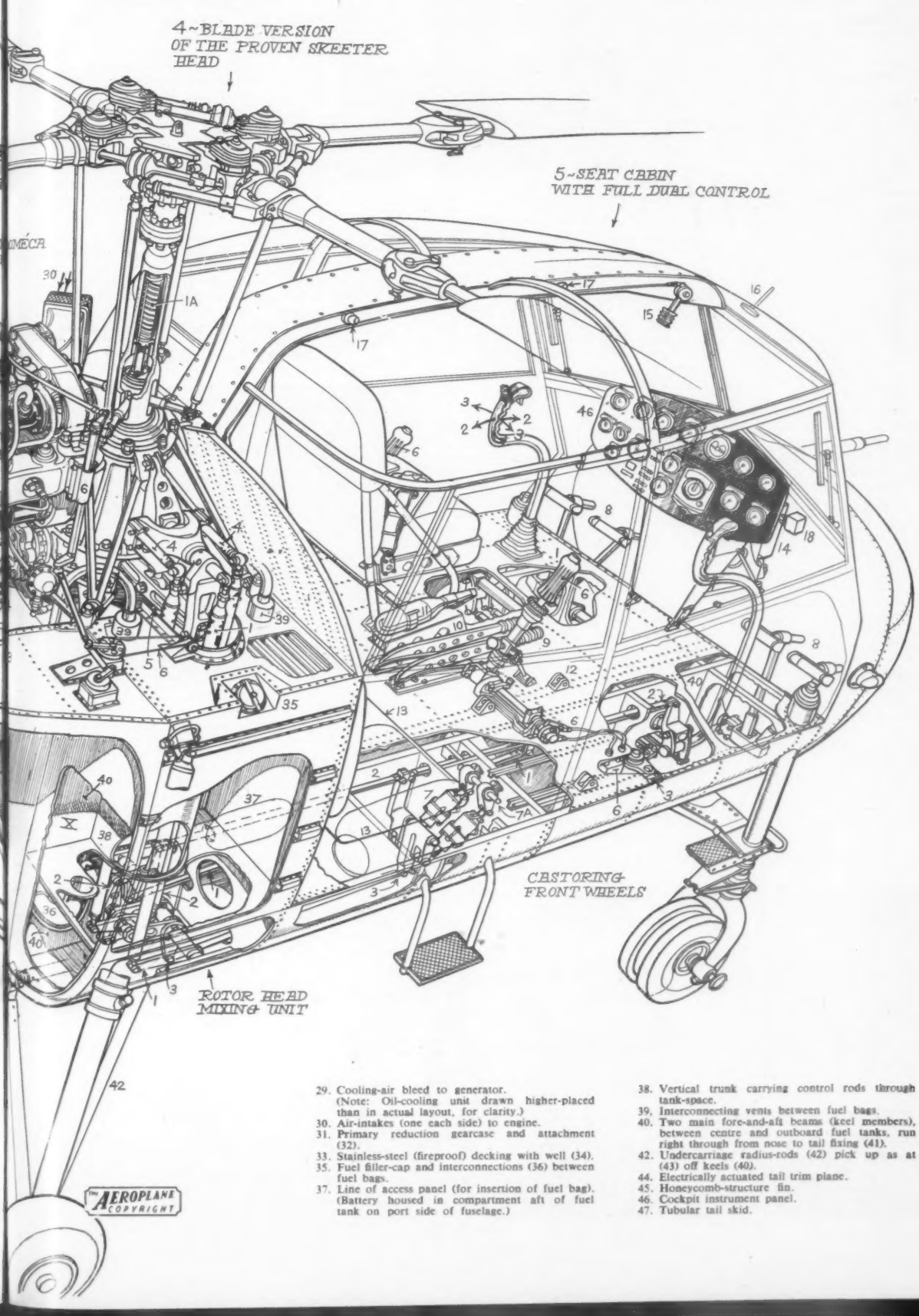
## One Blackburn-Turboméca Turmo 600 450-s.h.p Shaft Turbine




*Drawing by*
*J. H. Clark, A.R.Ae.S.*

**KEY**

1. Collective-pitch control (with spring-loading (1A) in pylon).
2. Cyclic-pitch (fore-and-aft) to operate arms (4) contrariwise.
3. Cyclic-pitch (lateral) to operate arms (4) in unison.
   With final motion for (1), (2) and (3) all on arm (5).
6. Twist grips (throttle) and control-run.
7. Cyclic-pitch electric trim-jacks (rubber bush mountings (7A) give self-centring and stick "feel").
8. Tail-rotor pitch control (rudder bars and runs).
9. Rotor brake control.
10. Wheel brake control.
11. Extinguisher.
12. Seat fixings.
13. Line of rear (three) seats.
14. Radio.
15. Rotor r.p.m. control (H.P. fuel cock on port side).
16. Air temperature thermometer.
17. Lamps (cockpit illumination).
18. Remote control for Plessey radio.
19. Engine and gearbox mountings.
20. Reduction gearbox and free turbine with take-off (21) to main rotor and (22) to tail rotor via shaft (22A).
23. Power turbine governor.
24. Dessyn for selected rotor r.p.m. dial on instrument panel.
25. Twin jet exhausts.
26. Secondary gearbox-oil cooler.
27. Engine and primary gearbox-oil cooler.
28. Line of fan which puts air through (26) and (27).


4-BLADE VERSION OF THE PROVEN SKEETER HEAD
5-SEAT CABIN WITH FULL DUAL CONTROL
CASTORING FRONT WHEELS
ROTOR HEAD MIXING UNIT
THE AEROPLANE COPYRIGHT

29. Cooling-air bleed to generator. (Note: Oil-cooling unit drawn higher-placed than in actual layout, for clarity.)
30. Air-intakes (one each side) to engine.
31. Primary reduction gearcase and attachment (32).
33. Stainless-steel (fireproof) decking with well (34).
35. Fuel filler-cap and interconnections (36) between fuel bags.
37. Line of access panel (for insertion of fuel bag). (Battery housed in compartment aft of fuel tank on port side of fuselage.)
38. Vertical trunk carrying control rods through tank-space.
39. Interconnecting vents between fuel bags.
40. Two main fore-and-aft beams (keel members), between centre and outboard fuel tanks, run right through from nose to tail fixing (41).
42. Undercarriage radius-rods (42) pick up as at (43) off keels (40).
44. Electrically actuated tail trim plane.
45. Honeycomb-structure fin.
46. Cockpit instrument panel.
47. Tubular tail skid.

# NEWS OF INDUSTRY

## Crash Rescue Craft

INTENDED for use at Speke Airport, Liverpool, a mobile rescue unit designed for airports situated near the sea or other large stretches of water was recently demonstrated by its makers, the R.F.D. Co., Ltd., of Godalming, Surrey. Consisting of a powered inflatable rubber craft, known as the Zodiac boat, mounted on a trailer for transportation, the unit can either be towed behind another vehicle or manhandled.

Primarily designed for military purposes, the Zodiac boat has a shallow draught and when equipped with a 650 c.c. motor it can maintain speeds of more than 24 knots. Its main buoyancy tank is subdivided into numerous compartments and the fabric floors are reinforced with a detachable wooden framework and transom. Suitable for long-range work with five to seven persons on board, or for shorter journeys filled to capacity, the boat has a petrol tank box, mast, navigation lights, and searchlights, and batteries specially designed by M.T.C.A. for rescue work.

The trailer is a converted Coventry-Climax pump chassis modified by M.T.C.A. with special fittings to meet the launching problem. It can also be fitted with flotation tanks and sea-brakes. The engine used by M.T.C.A. is the 15-h.p. twin-cylinder Evinrude "Fastwin."

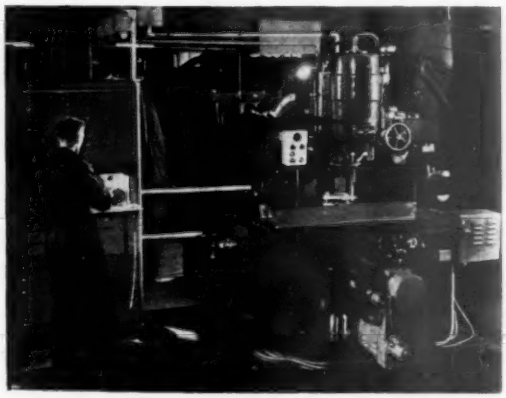
The R.F.D. Zodiac boat powered by an Evinrude "Fastwin" 15-h.p. motor, mounted on its trailer. Weighing 132 lb. the boat has a load capacity of 2,200 lb.

## Small Quantity Production

ONE of the main problems facing the aircraft industry is the need to produce a wide variety of components that are required only in small quantities. Conventional methods of tooling-up for mass production are in most cases quite uneconomic, and one solution to this problem that has already been applied successfully by Short Bros. and Harland, Ltd., of Belfast, is the introduction of electronically controlled machine tools.

The company has for some months been operating a Cincinatti vertical milling machine fitted with an electronic control system designed and manufactured by E.M.I. Electronics, Ltd., of Hayes, Middx., for production work in one of its machine shops. Although machine tools fitted with E.M.I.'s control systems have for some time been used for specialized work, this is believed to be one of the first that has been employed directly on the production floor.

Operated on a double-shift, 16-hr. day, the milling machine is employed for additional profile milling. It is programmed from a punched tape, which can be amended by the use of the built-in computer in the control system.



The E.M.I. electronically controlled No. 3 Cincinnati vertical milling machine in operation at the Belfast works of Short Brothers & Harland, Ltd. The electronic control equipment with its associated punched tape unit can be seen on the left. The machine has been in use on the production floor for some months.

## Steel Sheet Development

A NEW pre-coated steel sheet for vitreous enamelling has been announced by John Summers and Sons, Ltd., of Shotton, Chester. Now in commercial production, it is stated to be the first development of its kind.

Known as Nitec, it consists of an enamelling grade sheet-steel base, which is produced in a basic open-hearth furnace and is rolled by the continuous wide-strip mill process. After annealing and cleaning, the sheet is coated with nickel and a protective coating of zinc. Costing approximately £8 per ton more than ordinary vitreous enamelling sheet steel, Nitec eliminates several stages in the vitreous enamelling process. Nitec need be "pickled" only for a period of 3 min., during which time the zinc coating will be removed and the steel degreased. The removal of the zinc coating exposes the nickel flash ready for enamelling.

It can be welded by all the accepted methods without special tooling.

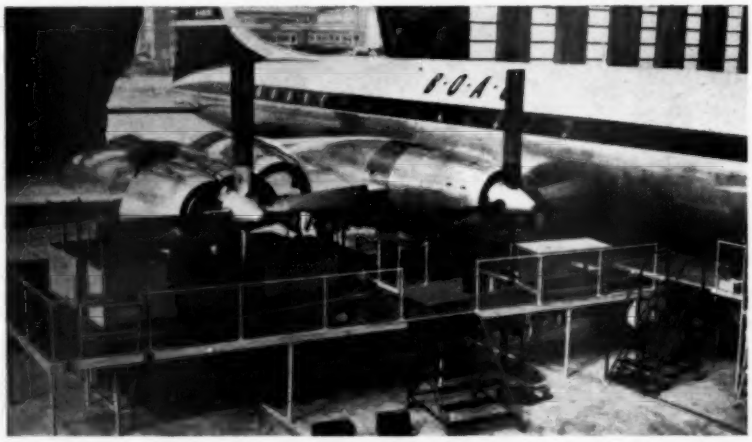
## Britannia Maintenance Docks

LAST March, maintenance docks were installed in the B.O.A.C. wing hangar at London Airport for servicing the Corporation's Britannia fleet. Designed from a general B.O.A.C. scheme and supplied by Mercury Aircraft Equipment, Ltd., of Gloucester, the four docks now in use are stated to be the first of their type to be erected in this country.

Constructed to accommodate both the short- and long-range Britannias they are built on the unit principle. Each complete dock consists fundamentally of a series of platforms, so constructed and assembled that they conform to the entire shape of the aircraft's inner wing and fuselage forward to the freight compartment area. The key position of the dock is around the powerplants, and the staging is so designed that the four propellers can be revolved with the aircraft in position.

For work on the powerplants eight elevating platforms are provided, one on each side of each powerplant. These are air-operated and adjustable over a height of 4 ft., with operating controls on the individual platforms. Both air and electrical services are tapped from permanent supplies in the hangar to a central point on the dock and then fed to various points throughout the dock area.

Work benches are fitted at intervals on the staging and up to 50 men can easily be employed on the dock at any one time. Movement of a Britannia in and out of a dock is undertaken by tractor.




An assembled maintenance dock with its power points and work benches in the B.O.A.C. wing hangar at London Airport. The staging is so assembled that the propellers of the Britannia can be rotated for servicing.

# Flying the Friendship

*In this article,* FRANK H. HAWKINS, *a K.L.M. captain, reports in detail on the handling characteristics of the Fokker F-27 Friendship medium-range airliner, which is powered by two Rolls-Royce Dart turboprops.*

ON March 23 this year, one week ahead of schedule, the first production Fokker Friendship made its maiden flight at Amsterdam under the command of the company's chief test pilot, Jas Moll. This aircraft, EI-AKA, carried the colours of Aer Lingus and is scheduled for delivery to Dublin in October.

Having flown the first prototype F-27 in 1956, this seemed about the right time for me to make a further evaluation flight to assess to what extent the promises of the prototype had been fulfilled in the larger (3 ft. longer fuselage) production model. Fokkers kindly put the aircraft at the disposal of THE AEROPLANE's contributor for this purpose on May 3 at their factory on Schiphol Airport.

Once again, on an initial ground inspection, I could not avoid remarking on the considerable British stake in this enterprising Dutch project. Powerplant by Rolls-Royce, propellers by Rotol, landing gear by Dowty, brakes by Dunlop, fire protection by Graviner, etc. In the U.S.A., incidentally, the aircraft is known generally as the Fairchild F-27.

### Cockpit Layout

Any pilot familiar with the Convairliner series cannot fail to notice some clear similarity between the two cockpits, though the Friendship's "office" is somewhat smaller. This similarity is no mere coincidence. Fokker, which shares Schiphol Airport with K.L.M., went to considerable effort to sound out airline pilots on their conceptions of a good cockpit. K.L.M. has a considerable fleet of Convairs, and the cockpit of this successful aircraft is widely recognized as one of the best yet produced.

The visibility from the Friendship is excellent and the engineering of the side sliding windows looks good. These side windows are large enough to act as emergency exits (though I fear the better-fed of us might, like Winnie the Pooh in Rabbit's house, get stuck in the hole). Forward of these sliding windows on each side is a direct-vision window.

The cockpit gives an immediate impression of a businesslike neatness, with switches and levers well spaced and generally sensibly located. Unlike most aircraft, there seem not to be enough switches to fill the available panel space. Engine controls for the two Darts are, of course, quite simple, and Fokker has considered one set of power levers, centrally mounted on the pedestal, sufficient. I found the reach required, though a little long, not an embarrassment. The two high-pressure fuel-cock levers are wide apart, one either side of the power levers, and this greatly reduces the risk—not to be underestimated—of feathering the wrong propeller.

The location of the flight-control lock handle seems unfortunate. It is on the bulkhead behind the captain's seat and has to be operated by the left hand, which might be better employed at such times in the vicinity of the nosewheel steering.

The lighting in the cockpit is interesting. Apart from a white roof light, all lighting is red and is derived from pillar and eyebrow lights. This applies not only to the instrument panel but also to all switch panels. In my experience with this type of pillar light, there is a tendency for the aperture to get maladjusted and for the top containing the bulb to come loose, particularly after any maintenance work in the cockpit. I wonder if a general red light directed at the switch panels might not have offered less risk of trouble. The instrument panel mainly uses eyebrow lights, which are more rigid than the pillar lights.

Instrument-panel lights are all fed from the battery bus-bar, the captain's and co-pilot's panels being independently controlled for intensity. It seems that, particularly in a comparatively small cockpit such as this, the whole panel lights should be controlled from one switch, which can be operated by the captain, but this is, perhaps, a matter of opinion.

The Collins Integrated Flight System is specified by Aer Lingus, but an assessment of this system hardly comes within the general scope of this particular article.

### Starting and Taxi-ing

The engines can be started using the aircraft batteries. This is an essential feature of an aircraft which is designed to operate into remote fields where adequate ground power may not always be available. The piston-engine pilot will be delighted by the simplicity of engine starting on a turbine. One simply selects the engine, presses the button and opens the high-pressure fuel cock.

The lack of vibration on starting is noticeable, as on any turbine, but I found the noise level in the cockpit during taxi-ing rather higher than in the Viscount.

One of my criticisms of the first prototype was the rather

inadequate nosewheel steering. This is a pneumatic system (the F-27 has no hydraulically operated services) and has given considerable difficulties. For this flight, unfortunately, the nosewheel steering was unserviceable pending modification, and it was consequently not possible to make a revised assessment. Fokker are very conscious of the problem and are seriously tackling it.

The lack of nosewheel steering, however, served to emphasize the excellent directional control available from the prominent rudder during take-off.

Taxi-ing using primarily the pneumatic brakes (turbines do not respond to "pump handling" in the same way as piston engines) takes some getting used to, as there is quite a lag in braking action. I was not too happy with this feature, but it is not likely to be an embarrassment when the nosewheel steering is available. The test pilot, once having become accustomed to their characteristics, finds little difficulty in taxi-ing using the brakes.

Pilots brought up on British equipment will miss the availability of a hand-operated brake, while those used to Lockheed, Douglas and Convair airliners will be at home with the F-27 toe-brakes. The parking brake is a single T-handle conveniently located on the left side ahead of the captain. It cannot, therefore, be operated from the co-pilot's seat.

The normal brake system is Maxaret protected. An emergency, and quite independent, brake system, without "anti-skid," is operated by a knob mounted on the captain's side console panel. This facility is also not available to the pilot in the right-hand seat, which might be a little inconvenient if required during training flights or if the captain should at other times fly from the right-hand seat. However, the Friendship is not the only aircraft with this characteristic.

The 12-ft.-diameter Rotol propellers' ground clearance of approximately 3 ft. will bring joy to those who have to meet the bill for constant blade damage from loose stones, etc.—a heavy expense unavoidable on most low-wing aircraft. Once again, this is a favourable feature for an aircraft designed to operate into the type of airfield customarily used by the Dakota.

**Taking Off**

The take-off was at maximum landing weight (34,000 lb.). I had previously arranged that Jas Moll should cut one engine at a little below $V_2$.

Using a technique which airline operators may prefer for passenger comfort, I opened up to 12,000 r.p.m. on the brakes then applied 14,500 r.p.m. (take-off power) while rolling. There was no appreciable cabin-pressure surge. Without nosewheel steering, and with no use of brake or differential power, there was no difficulty in keeping the nose on the centre-line.

Even after No. 2 engine (the most critical) was cut, a steady application of rudder kept the aircraft perfectly straight. The cross-wind component was only 5 knots. During the take-off run with all wheels on the ground, directional control is available using rudder alone following engine failures above 60 knots. The $V_{MCA}$ is 78 knots at sea level and is not a critical factor in determining the scheduled $V_2$ speeds for the F-27.

On this occasion $V_2$ was 92 knots and we initially climbed away at this speed, increasing to 112 knots, clean. The landing gear fully retracts in 5 sec., an excellent feature. Engine-out training on this aircraft should present no difficulties.

The time from releasing brakes to $V_2$, including the slower power-application technique (12,000 r.p.m. instead of 14,500 r.p.m. on the brakes), and the engine failure was 26 sec., compared with a certification test figure of 22 sec. for a standard take-off.

The automatic feathering system must be operational for every take-off, as the flight manual runway-length requirements are based upon automatic feathering of the propeller in the event of an engine failure during take-off.

**Climb and Cruise**

During low-speed/high-power conditions there was some vibration. This has since been investigated and it appears that it was caused by an auxiliary gearbox drive shaft bearing. Vibration completely disappeared after changing it.

With the very conspicuous dorsal fin and rudder it is not surprising that directional stability is good, somewhat better, in fact, than the lateral stability. This aircraft should provide no problems for instrument approaches. During 45° banked turns height control was unusually easy and no airline pilot in training should find the least difficulty in maintaining height during a steep (45°) turn within ±50 ft. of datum.

Power control is by means of two power levers, with fine adjustments to maintain J.P.T.s within limits by fuel trimmers. The power levers are well designed, with a positive movement which makes small power adjustments easy to apply and relatively accurate.

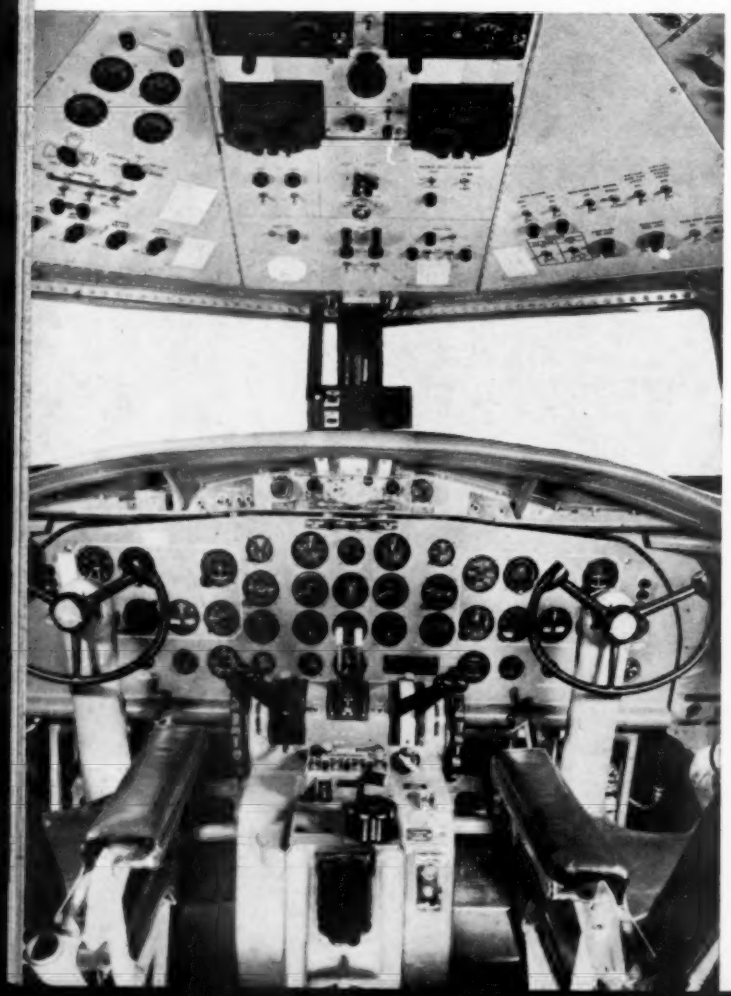
The Dart is a godsend to an aircraft manufacturer, not least when considering reliability and simplicity in emergency procedures. Engine fire and failure procedures are simple and pretty foolproof on the F-27 and hardly require further comment. This fact, added to the favourable directional control characteristics and rapid gear retraction demonstrated during take-off, casts a pleasant light on the safety features inherent in this aircraft.

The pitch change following alterations in flap extension is very marked and the pilot must certainly anticipate this in correcting the aircraft attitude. The maximum speed for flap extension to 25° is 140 knots, and to 40° (full) is 130 knots. If a normal descent at destination from cruising altitude is made in the speed range of 200-230 knots, it is clear that considerable deceleration is required when entering the holding or circuit area before extending any flap. For this purpose, the use of the landing gear as a dive brake must be considered. The maximum gear extension speed is 170 knots. The "gated" flap positions are 0°, 10°, 15° (circuit), 25° (approach), 40° (landing).

The operation of the three control-surface trim wheels in the cockpit is not consistent, in that the elevator and rudder trim are highly sensitive to movement, while the aileron trim certainly is not, though all are quite positive. In my view, the elevator and rudder trim may be too highly geared for accurate adjustment, while the aileron knob gearing might possibly be raised a little. This criticism, however, is not a serious one. The location of the elevator trim wheel, and the rubber grip on it, are very good features.

As a result of the spring tab on the ailerons, they are light at cruising speeds but load increases at lower speeds, and at the threshold speed is noticeably higher. However, I found the ailerons in no way unpleasant and feel that any attempt to lighten them further might not be appreciated by airline operators, who must carefully consider passenger comfort. Handling at low speeds, in the approach and landing configuration, was quite positive and the aircraft responded well to rough handling.

The clean stall was quite docile at 85 knots. In the landing configuration a fair amount of aileron was needed in addition to rudder, as there is a marked tendency to drop a wing. In



THE BRIDGE.—The pilots' cockpit of the prototype Fokker Friendship.

SECOND PROTOTYPE.—The author states that in the production aircraft there is "excellent directional control available from the prominent rudder." About 60 Friendships are at present on order from the Dutch Fokker company, and more than 70 from the Fairchild company in the U.S.A.

this configuration the aircraft stalled at 69 knots. The C.A.A. has stipulated that a stall-warning (stick-shaker) device be installed to cover the 30° bank, full flap, case, when the natural warning is almost non-existent. This will be electrically associated with the flap section, so that it is only in circuit when 40° flap is extended. This feature is not yet installed, but will be incorporated on all models before delivery.

Fuel-usage policy hardly needs writing up. With two engines, two tanks (with two booster pumps each) and a cross-feed line, the normal operating procedure is to have all pumps on, with the cross-feed off, so each tank is feeding its own engine.

Because of the excellent weather in the Amsterdam area it was not possible to do any practical wing de-icing tests. Many pilots who have become accustomed to thermal aerofoil anti-icing (as on the Viscount, DC-7, Convair, etc.) may consider the Goodrich de-icer boots on the Friendship a retrograde step. However, it was not found possible to meet the new C.A.A. icing requirements with the thermal system fitted on the prototype. The heavy icing trials made by Fokker have proved the effectiveness of the new type of Goodrich boots. These have chordwise inflation tubes, which result in negligible drag compared with the former spanwise system.

### Circuit, Approach and Landing

With the Rolls-Royce restriction of a minimum torque of 60 p.s.i. (due to possible damage to the forward layshaft in the propeller reduction gearing), deceleration to circuit speed after a high-speed descent can, as mentioned earlier, require some careful anticipation.

I flew downwind with 15° flap, 140 p.s.i., gear up, at 115 knots. Turning on to base leg, the gear was extended to initiate descent and before reaching final the flap was increased to the approach setting of 25°. The final approach speed used was 105 knots with a power setting of 100 p.s.i. This speed provided good controllability and, incidentally, allows flaps to be raised immediately in the event of an overshoot (1.2 Vso, 0° flap, maximum landing weight = 102 knots).

The threshold speed was 90 knots, and at this speed the ailerons were somewhat heavier than at circuit speed, but this did not seem to me a great disadvantage. On the first prototype the aileron appeared even heavier at low speeds and it was pleasing to note the improvement in the production model.

Round-out and touch-down provided no problems and, once again, during the roll-out without nosewheel steering, the rudder effectiveness was clearly apparent.

At about this time in a Dart-powered flight the pilot's thoughts turn to "ground fine pitch" (or, on piston-engined aircraft, to "reverse"). On the Viscount "ground fine" becomes available automatically as a result of the action of the oleo micro-switches on the main gear. On the F-27, however, the removal of the flight fine-pitch locks is effected by a manually operated button located on the pedestal. Herein lies a story.

The Friendship is to receive its certification from the U.S. C.A.A., as the Dutch Government does not issue an original C. of A. but normally only validates one issued by a foreign manufacturer's Government. In addition, the fact that Fairchild is building the aircraft under licence in the U.S.A. has influenced the procedure in this case.

Now, following the Capital Airlines' Viscount accident in February, 1956, in which the propellers moved to ground fine pitch on final approach, the C.A.A. has been very sensitive to this feature and, in spite of the since-modified micro-switches and other safety devices, it has insisted on having the removal of the flight fine-pitch locks under the pilot's direct control. In addition, the R.L.D. (Dutch A.R.B.) has required a safety guard over the button, to prevent inadvertent operation. When I came to use it after landing I found another pair of hands was necessary.

This C.A.A. requirement has, indeed, raised a number of problems and caused a few headaches. Modifications have since been made. Ground fine pitch is now selected by bringing throttles fully back, lifting and bringing back again.

On this occasion we did not use the Maxaret anti-skid device as I had flight-tested the installation on the original prototype, and was most impressed by its performance. There is no doubt that it relieves the pilot of the former anxiety that he would never be able to repeat the precise judgment of the factory test pilot who made the landing and accelerate-stop distance certification tests on which the flight manual is based.

The surface wind was not strong enough to assess the cross-wind landing characteristics of the aircraft. However, it has

PEOPLE CONCERNED.—Left to right, Capt. P. Little (Aer Lingus), the author, and Mr. J. Moll (Fokker).

already been officially demonstrated with a 20-knot cross-wind component. The test pilot prefers the "wing-down" technique, which involves no special problems on the F-27, to the "crab-and-kick-straight" method.

Although the prototype has been flown on occasions with only one crew member, the aircraft will be certified to fly with a minimum crew of two pilots, or one pilot and one engineer. In fact, the only controls in the cockpit outside the reach of the captain are those of the cabin pressurization and wing de-icer.

### Conclusion

From the number of orders (132 firm orders and 33 options already received by Fokker and Fairchild, it appears rather late to suggest that this is going to be a successful aeroplane and that it is much more than just a DC-3 replacement. Pilots, I feel sure, will take well to it.

A pilot transferring from a piston-engined aircraft would be well advised to take a comprehensive Dart course, either at Derby or at one of the overseas stations where Rolls-Royce has equipped a classroom. If possible, such a course should be supplemented by engine-handling training on an engine simulator or a synthetic flight trainer equipped with faithfully simulated Dart engines (such as a Viscount Simulator if an F-27 type is not available).

He will also need some sound briefing on the somewhat modified operating techniques associated with turboprop aircraft, particularly in relation to fuel policy.

Bearing these points in mind, he will find the Friendship a friendly aircraft, which is new without being revolutionary, and to which he can profitably apply the experience and techniques acquired from earlier aircraft.

### Operating Limitations

**Max. Speeds (all C.A.S. knots)**

$V_{NE}$ (never exceed), 259 knots; $V_{NO}$ (normal operating), 227 knots; $V_A$ (manœuvring and turbulence), 154 knots; $V_{FE}$ (flaps-extended speed) to 25°, 140 knots; to 40°, 130 knots; $V_{LE}$ (landing gear extended), 170 knots; $V_{LO}$ (operation of landing gear), extension 170 knots; retraction, 140 knots; maximum speed for landing-light extension, 170 knots; maximum approved operating altitude, 20,000 ft.; maximum pressure differential, 4.42 p.s.i.; normal pressure differential, 4.16 p.s.i.; minimum pneumatic-system pressure for take-off, 2,000 p.s.i.

Brake anti-skid must be operational for take-off as runway lengths are based on the use of the system.

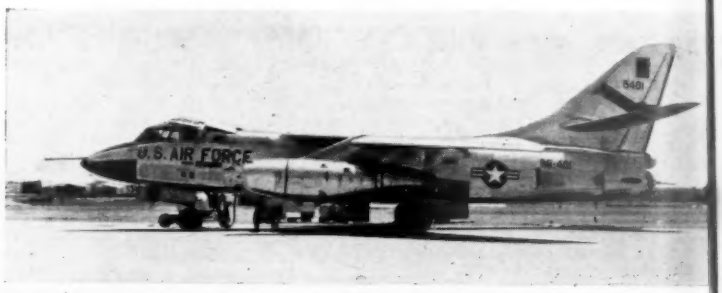
Floor loading maximum, 70 lb./sq. ft.; maximum take-off weight (wet and dry), 35,700 lb.; maximum landing weight (wet and dry), 34,000 lb.; maximum zero fuel weight, 32,400 lb.

Engine limitations as specified for the Rolls-Royce Dart 511.

Maximum usable fuel quantity, 945 U.S. gal. (787 Imp. gal.).

# New World Photo-News

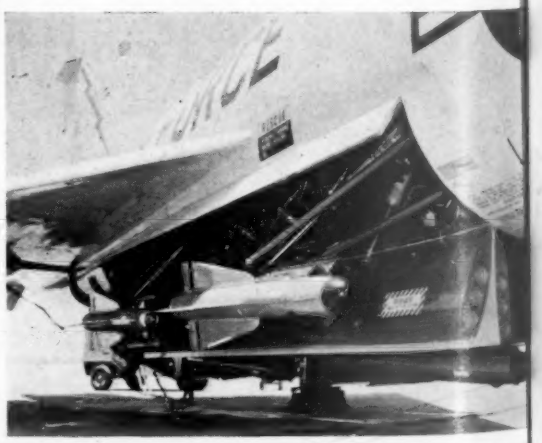
*Pictures by Howard Levy*



Above, the latest series of the Douglas Destroyer is the WB-66D, used for weather operations.

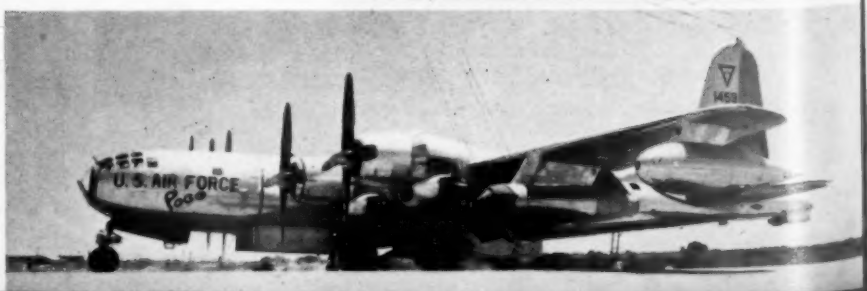
Left, the Convair TF-102A Delta Dagger is a two-seat combat trainer and tactical interceptor version of the F-102A, and has a Pratt & Whitney J57 turbojet.

Below, carried by the Convair F-102A are six GAR-1D and GAR-2 Falcon missiles, and 24 2.75-in. folding-fin aircraft rockets.



Left, tail armament of the Boeing B-52E Stratofortress consists of an Arma MD-9 dual-unit lock-on radar system for long-distance search and short-range tracking, with alternative optical periscopic gun sight. The four guns are 0.5-in. Brownings.

Below, newest of the Boeing Superfortress tanker series is the KB-50K, which has auxiliary under-wing jets.



# Sailplanes at Leszno, 1958

by Peter W. Brooks, B.Sc., A.C.G.I.

THE International Gliding Championships this year were the sixth to be held since the War and the first on the other side of the Iron Curtain. In the 10 years since the first post-War event in 1948, the Championships have been held every two years and have contributed powerfully to the advance of sailplane design as well as to rapidly improving flying techniques. They have also provided a unique opportunity for assessing the progress being made in both these fields.

With the Championships being held this year in Poland after 10 years of post-War development, this meeting promised to give a better picture than ever before of what is being achieved, in both the West and Communist worlds. However, we were disappointed so far as the latter are concerned.

The Communist countries pre-eminent in gliding — Poland, Czechoslovakia, Hungary and Yugoslavia—were, of course, present in strength, but they have been well represented in previous Championships held in the West and are therefore already familiar opponents. The Soviet Union itself, China and some of the other Russian satellites had been expected to make impressive appearances. The U.S.S.R. did, in fact, send a team, but it flew borrowed Polish gliders and proved to be a most undistinguished performer. None of the other Eastern-bloc countries was even represented.

Two years ago the writer contributed a commentary in THE AEROPLANE (August 3, 1956) on the sailplanes which took part in that year's World Championships held at St. Yan in France. That competition was remarkable for the evidence it gave of new thinking in the field of sailplane design and for the number of new designs which participated. Leszno proved to be less interesting in this respect—there were seven types of aircraft completely new to International Championship flying (compared with 12 at St. Yan)—but it was equally stimulating for different reasons.

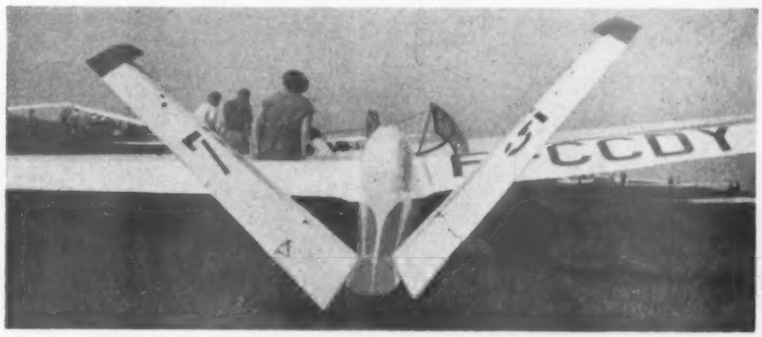
Largely as a result of discussions at St. Yan, the Fédération Aéronautique Internationale decided that future Championships should no longer include a separate competition for two-seaters—which had first been introduced in 1954. Instead, there was to be an open contest for unrestricted designs and, in parallel, a competition for "Standard Class" machines which were to meet certain previously laid-down requirements aimed at ensuring that these aircraft were cheap to build and straightforward to operate. They would thus be best suited to serving the normal day-to-day needs of the sport of gliding, rather than the specialized demands of international championship flying.

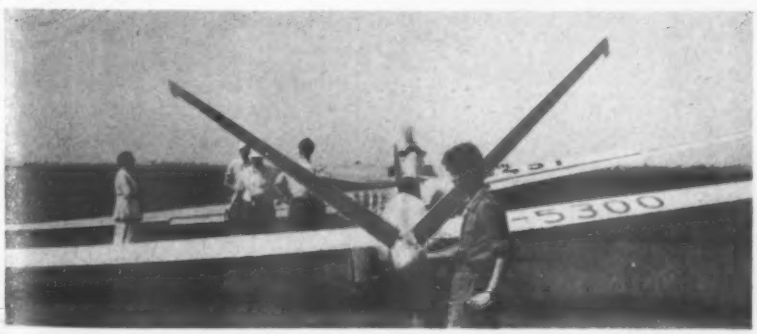
Such is the level of enthusiasm in this remarkable international sport that no less than 10 different types appeared at Leszno, designed from scratch or adapted from earlier designs to meet the requirements of the Standard Class competition. Thus, the proposals crystallized at St. Yan were fully tested—and, in the event, proved to be outstandingly successful—within two years.

In the final results, taking the Open and Standard Classes together, a Standard Class machine was second in the combined placings and there were no less than three of the 15-metre machines in the first eight, despite the fact that Open Class entries outnumbered those in the Standard Class by 38 to 24. Simple, limited-span sailplanes which have been designed to meet normal gliding club requirements, seem to be able to compete on almost equal terms with the most sophisticated products of the sailplane designer's art.

The Leszno Championships were also exceptionally interesting for another reason. They were the first at which sailplanes designed since the War finally excluded any pre-War design from a place in the first half of the field. Hans Jakobs' classic designs, the Weihe and Meise, are only now—at long last—shown to be obsolete. No Weihes were entered in the Championships this year and the two surviving Meises—actually Danish Elliott-built Olympia 20s—were placed well down the field in the Standard Class.

It is salutary to remember that Weihes won the first two post-War Championships and that there was at least one Weihe in the first five places in every championship until the 1956 contest, when the best place achieved was 12th. This year the famous old gladiator had finally disappeared from the arena.





THREE OF A KIND.—Vee tails on the French Breguet 905 (above), the Polish Jaskolka L (SZD-17x) experimental (left) and the West German HKS1 (bottom).

Table I lists the types of sailplane which won the first 20 places in all six of the post-War gliding Championships. Table II gives a few of the more significant characteristics of the five most successful designs in each Championship. The most successful designs have been determined by a crude—and certainly arbitrary and perhaps rather unfair—system of marking which gives 20 points to the winner, 19 to the second place, 18 to the third and so on down to one point for the 20th. Two-seaters have been ignored where they competed in a separate class and the placings for the 1958 contest have been obtained by counting the Open and Standard Classes as one for this purpose.

With all its limitations, this analysis does bring out a number of interesting conclusions. These can be summarized as follows:—

(1) The 1954 Championships at Camphill were important as marking a

**TABLE I**

**The most successful types of sailplane in the post-War International Championships**

| Place | Sameden | | Orebro | | Madrid | | Camphill | | St. Yan | | Leszno | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 1948 | | 1950 | | 1952 | | 1954 | | 1956 | | 1958 | | |
| 1 | Weihe | S | Weihe | S | Sky | F | *Breguet 901** | R | *Breguet 901S** | R | *HKS–3** | R | 1 |
| 2 | Air 100 | S | Weihe | S | CM.8–15* | F | Sky | F | Sky | F | Mucha–Standart | F | 2 |
| 3 | Mosweу III | S | Orao II* | S | Sky | F | Weihe 50 | S | Jaskolka Z* | R | *Skylark III* | F | 3 |
| 4 | Weihe | S | Weihe | S | Sky | F | Schweizer 1–23E (M) | F | *Meteor** (M) | R | *Demant** | R | 4 |
| 5 | Weihe | S | Weihe | S | Weihe | S | Weihe | S | *Olympia 402* | S | *Meteor 57** (M) | R | 5 |
| 6 | Air 100 | S | Weihe | S | Schweizer 1–23 (M) | F | Weihe | S | *Skylark III* | F | *Zugvogel IV* | S | 6 |
| 7 | Meise (Nord 2000) | S | Weihe | S | Sky | F | *Breguet 901** | R | Sky | F | Jaskolka Z* | R | 7 |
| 8 | Mosweу III | S | Weihe | S | Mosweу III | S | Sky | F | *Elfe M** | S | *Ka–6BR* | F | 8 |
| 9 | Air 100 | S | Air 100 | S | Sky | F | Orao IIC* | S | *Zugvogel II** | S | *Breguet 901S** | R | 9 |
| 10 | Gull IV | F | Air 100 | S | Weihe | S | Sky | F | *Skylark III* | F | *Olympia 419* | S | 10 |
| 11 | Meise | S | Weihe | S | Sky | F | Meise (Olympia) | F | *Skylark III* | F | *Zugvogel III* | S | 11 |
| 12 | Kranich | S | Mosweу IV | S | Condor IV | F | Meise (Olympia) | F | Weihe | S | *Zugvogel III* | S | 12 |
| 13 | Air 100 | S | Weihe | S | Weihe | S | Weihe | S | Air 102 | F | *PIK–3C* | F | 13 |
| 14 | Meise | S | Weihe | S | Sky | F | *Olympia 401* | S | *Breguet 901S** | R | *Spartak** | R | 14 |
| 15 | WLM–1* | S | Weihe | S | Weihe | S | Schweizer 1–23D (M) | F | *Skylark III* | F | *Ka–6* | S | 15 |
| 16 | Air 100 | S | Hutter 28 | S | Weihe | S | PIK–13 | S | Barros Neiva I | S | Mucha–Standart | F | 16 |
| 17 | Weihe | S | Meise (Olympia) | S | Weihe | S | *HKS–1** | R | *Demant** | R | *Meteor 57** (M) | R | 17 |
| 18 | Mosweу III | S | Fi–1 | S | Schweizer 1–23 (M) | F | Meise (Olympia) | F | *Breguet 901S** | R | *Olympia 415* | S | 18 |
| 19 | Meise (Nord 2000) | S | Mosweу VI | S | Sohaj | S | Orao II C* | S | Air 102 | F | Ilindenka | S | 19 |
| 20 | WLM–1* | S | Mosweу III | S | Weihe | S | Sky | F | Meise (Olympia) | F | *Demant** | R | 20 |

(Names in italics denote aircraft with laminar wing sections. An asterisk signifies that flaps are fitted. All-metal designs are marked (M). Type of undercarriage: S=skid only. F=fixed wheel. R=retractable wheel.)

turning point in sailplane development because of the introduction of laminar-flow wing sections and the success which they achieved, and have increasingly achieved since.

**(2)** Laminar-flow wing sections have now won almost universal acceptance for current competition sailplanes. However, there is still considerable division of opinion over whether thick or thin sections should be used.

**(3)** On the evidence of recent Championship results it would appear that thin (12% to 16%) laminar-flow sections are more successful than thick ones (18% to 20%). However, the Skylark III with a 20% thick section was near the top at Leszno.

**(4)** Undercarriage design is following a logical trend which is eliminating the plain skid and replacing it with a built-in wheel which, in turn, now has to be made retractable in truly high-performance aircraft.

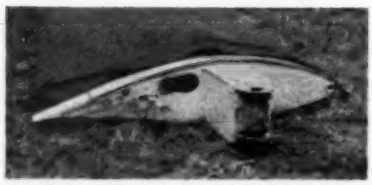
**(5)** Flaps have been tried at intervals ever since 1948 and designs fitted with flaps started to make their mark also from 1954. Although flaps have not yet achieved the degree of acceptance won by laminar-flow wing sections, they are now fitted to an important proportion of the most successful designs. A Fowler type of flap is that most commonly used. There is still considerable debate about the effectiveness of flaps in practice.

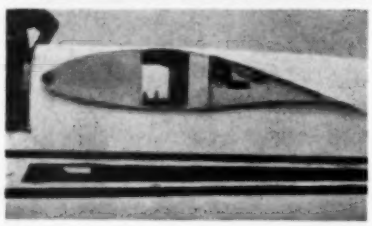
**(6)** Wing loading has increased 25% in 10 years. Whereas the successful designs had loadings of around 20 kg./sq. metre in the immediate pre- and post-War years, this figure has now risen to about 25. Some successful designs now have loadings of more than 30 kg./sq. metre.

**(7)** Surprisingly, there does not seem to be any real correlation between the climatic conditions in which recent Championships have been held and the relative success of high and low wing loading. Thus, the Camphill Championships, which were held in poor soaring conditions, were won by a Breguet 901 with a high wing loading (28 kg./sq. m.). On the other hand, the Sky, with a fairly low wing loading, came second in the St. Yan Championships held in very good soaring conditions.

**(8)** There was a distinct trend towards greater wing spans up to 1956. However, the introduction of the Standard Class in 1958 has immediately re-established the 15-metre sailplane amongst the leaders. Indeed, the 15-metre Mucha-Standart rates first in performance merit in 1958, on the evidence of the marking system used in this article.

Slotted flaps of Spartak partially open.





Spartak wing-fix details. Upper, the wing-root "plugs." Lower, fuselage sockets.

**(9)** In general, proven production gliders seem to have done best in the International Championships. However, it is perhaps significant that the marking system in Table II puts prototypes in the first three places at Leszno in 1958. Quite "fierce" new prototypes have done well several times in previous championships.

**(10)** Metal construction continues to make slow progress in Europe. The remarkable Yugoslav Meteor prototypes are showing what can be done when "money is no object" but the American Schweizers remain alone in the field of metal sailplane production in serious quantities.

**(11)** The success of British sailplanes in the field of international competition flying is suffering a decline. We made a slow start in this country after the War but by 1952 we had reached a position where British Slingsby Skys took seven out of the first 14 places, including winning the Championship. Although we did not win in either 1954 or 1956, British gliders did extremely well in both these years—particularly so in 1956.

Spartak tail unit with one half folded.

By comparison, British designs were almost eclipsed at Leszno. Only three British gliders appeared in the first 20 and these were all aircraft in the British team.

**(12)** The reasons for this are fairly clear. British design techniques are now lagging seriously behind those of several Continental countries. Germany (the Federal Republic) has emerged once more as the World leader in sailplane development, while several Eastern European countries — particularly Czechoslovakia, Poland and Yugoslavia—are providing her with stiff competition which is putting the modest British effort completely in the shade.

### The Open Class Entries

There were only two entirely new designs entered in this Class. These were the Czechoslovak Spartak and the British

Olympia 419—for the 419 is sufficiently different from the 402 which flew at St. Yan to be regarded as quite new.

**L.21 Spartak.** This machine is, in appearance, a refined development of the V.S.M.40 Démant which first appeared at St. Yan. However, it is, in fact, an entirely new and more advanced design which did well to achieve 14th place in its first major contest. This year the Czech team flew three Démants and one Spartak.

The Spartak comes from the same designs table as the striking all-metal L.13 Blanik two-seater which made such an impression in 1956. However, in appearance, the new machine certainly gives the impression of being more closely related to the Démant. The main differences in the external appearance of the two types are the considerably shallower fuselage

The Czech Spartak with pilot in place and sliding hood open.

of greater fineness ratio and smaller vertical tail surfaces of the Spartak. The result is a very handsome machine, even more pleasing in appearance than the attractive Démant.

The wing span of the Spartak is 16 metres, which compares with 18 metres for the Démant, but the fuselage is half a metre longer and the all-up weight 30 kg. greater. Although no wing area has been published, it would appear that wing loading is greater than the already quite high 28.7 kg./sq. metre of the Démant.

The gliding angle has been quoted as 1 in 37, a significant improvement on the 1 in 34 of the Démant. The minimum rate of sink is claimed as slightly lower. The wing section of the Spartak is of unspecified laminar-flow type but appears to conform to the "thin-wing" philosophy exemplified by the Démant (15 to 12% thick).

The wing is built around a single spar consisting of two laminated wood booms boxed in conventional fashion by plywood webs. By adopting a straight leading edge (there is compound taper on the trailing edge), the designer, Karel Dlouhy, has been able to use very large pieces of the 10-mm.-thick sandwich skin to provide a wrap-around covering to the wing which extends from the underside of the mainspar forward and over the leading edge and back across the top surface to the aileron or flap junction near the trailing edge. A separate similar sandwich plank covers the undersurface from the mainspar to the rear edge.

The sandwich skin is reminiscent of that used in the Yugoslav Orao IIC (see description by B. S. Shenstone in THE AEROPLANE, August 20, 1954) and consists of a "filling" of an 8-mm. beech-wood plank with spanwise saw cuts on its inner surface. These cuts are 5-mm. deep and 7-mm. wide with 3-mm. webs left between them. The outer surface of the sandwich is 1.2-mm. ply and the inner 0.8-mm. ply. The Orao IIC skin differed in not having the inner ply capping to the "filling."

The Spartak wing is built up by fitting the outer ply inside envelope jigs shaped to give the required profile. The beech plank is then inserted and bent to shape —this being possible because of the saw cuts. Finally the inner ply is inserted. The wing profile is stabilized by quite widely-spaced (about 75-cm. interval) ply ribs which are in two separate sections forward and aft of the spar.

The resulting high standard of wing smoothness and freedom from waviness certainly justifies the trouble taken. The slight ripples present on the already

The French Breguet 905-01 prototype.

excellent Démant appear to have been completely eliminated.

The same applies to the fuselage of the Spartak which is remarkably free of surface waves. The front portion of the fuselage, one understands, is built using a similar sandwich method of construction to that employed on the wings.

The wings of the Spartak plug into fuselage sockets in the shoulder-wing position in the method, similar to model aeroplane practice, which is now popular with Continental sailplane designers. The "plugs" on the wing-roots are massive affairs perhaps 12 by 15 cm. in section and are pinned together on the aircraft's centre-line by a single pin, access to which is provided by a small door on the top of the centre section.

The torque tubes which actuate the flaps and the control rods self-connect as the wing is plugged into place. A single spigot locates the wing at the leading edge on each side.

As already mentioned, the Spartak's fuselage is very noticeably shallower than that of the Démant and this has been made possible by accommodating the pilot in a semi-reclining position. However, his view does not seem to have suffered. The canopy, which as in the Démant slides forward to open, is a remarkably successful compromise between the dictates of visibility and aerodynamic shape.

There is a curious spine along the underside of the fuselage which extends aft from the retracting wheel and may

**TABLE II.—Characteristics of Most Successful Championship Sailplanes, 1948-1958**

| Year | Rating | Number of points | Aircraft type | Wing span | Wing loading | Wing section (root) | Production | Year of first flight |
|---|---|---|---|---|---|---|---|---|
| | | | | m. | kg./m.² | | | |
| 1948 | 1 | 59 | Air 100 | 18.0 | 20.7 | GO 549 | Production type | 1947 |
| | 2 | 57 | Weihe | 18.0 | 18.8 | GO 549 | Production type | 1938 |
| | 3 | 34 | Moswey III | 14.0 | 19.1 | GO 535 | Production type | 1947 |
| | 4 | 33 | Meise | 15.0 | 20.0 | GO 549 mod. | Production type | 1939 |
| | 5 | 11 | Gull IV | 15.0 | 22.3 | GO 549 | Production prototype | 1948 |
| 1950 | 1 | 145 | Weihe | 18.0 | 18.8 | GO 549 | Production type | 1938 |
| | 2 | 23 | Air 100 | 18.0 | 20.7 | GO 549 | Production type | 1947 |
| | 3 | 18 | Orao II | 19.0 | 20.6 | GO 549R | Experimental prototype | 1949 |
| | 4 | 8 | Moswey IV | 14.4 | 20.7 | GO 535 | Experimental prototype | 1950 |
| | 5 | 5 | Hutter 28 | 12.0 | 22.9 | GO 535 mod. | Production type | 1935 |
| 1952 | 1 | 98 | Sky | 18.0 | 20.9 | GO 547 | Production type | 1950 |
| | 2 | 51 | Weihe | 18.0 | 18.8 | GO 549 | Production type | 1938 |
| | 3 | 19 | CM.8–15 | 15.0 | 23.6 | Non-laminar | Experimental prototype | 1950 |
| | 4 | 18 | Schweizer 1–23 | 13.4 | 21.7 | NACA 43012 | Production type | 1948 |
| | 5 | 13 | Moswey III | 14.0 | 19.1 | GO 535 | Production type | 1947 |
| 1954 | 1 | 57 | Weihe | 18.0 | 18.8 | GO 549 | Production type | 1938 |
| | 2 | 44 | Sky | 18.0 | 20.9 | GO 547 | Production type | 1950 |
| | 3 | 34 | Breguet 901 | 17.3 | 28.0 | NACA 63 Series | Production prototype | 1954 |
| | 4 | 22 | Meise | 15.0 | 20.0 | GO 549 mod. | Production type | 1939 |
| | 5 | 17 | Schweizer 1–23E | 17.3 | 23.2 | NACA 43012A | Production type | 1953 |
| 1956 | 1 | 42 | Skylark III | 18.2 | 22.2 | NACA 63$_3$620 | Production type | 1955 |
| | 2 | 33 | Sky | 18.0 | 20.9 | GO 547 | Production type | 1950 |
| | 3 | 30 | Breguet 901S | 17.3 | 28.0 | NACA 63 Series | Production type | 1954 |
| | 4 | 18 | Jaskolka Z | 16.0 | 33.5 | NACA 43012A | Production type | 1955 |
| | 5 | 17 | Meteor | 20.0 | 31.5 | NACA 63$_3$616–5 | Experimental prototype | 1955 |
| 1958 | 1 | 24 | Mucha-Standart | 15.0 | 25.1 | GO 549 | Production prototype | 1958 |
| | 2 | 20 | HKS–3 | 17.2 | 25.7 | NACA 65$_{m}$11$^{10}$ | Experimental prototype | 1955 |
| | 3 | 20 | Meteor 57 | 20.0 | 31.5 | NACA 63$_3$616.5 | Experimental prototype | 1955 |
| | 4 | 19 | Zugvogel III | 17.0 | 25.2 | NACA 63$_3$616 | Production type | 1954 |
| | 5 | 19 | Ka–6 | 15.0 | 24.2 | NACA 63618 | Production type | 1955 |

possibly be an aerial for the radio. The wheel is of sensible size but is enclosed when retracted by the same "fiddly" doors which have been criticized in the Démant. There is no skid.

The tailplane, again as in the Démant, folds by hinging upwards—a method which is growing rapidly in popularity and bids fair to become universal practice. About half the designs at Leszno incorporated this feature.

To sum up on the Spartak, this design clearly represents almost all that is best in current advanced technique on the Continent. Perhaps the only criticism is of the dive brakes which, to avoid breaking down the laminar flow on the critical top surface, extend from the lower surface only. These lower surface air brakes, as is not unusual, are said to be of limited effectiveness. However, the Spartak bears the imprint, in almost its every other feature, of a designer who knows what he is doing. The aerodynamic design is commendably straightforward—there are no symptoms of uncertainty, such as unnecessary form balances on control surfaces—the method of rigging the wings has been usefully simplified on that employed in the earlier Démant and, perhaps most interesting of all, the flaps look as if they may really work in terms of improving the soaring performance.

Discussion at the OSTIV Congress made it clear that there is still a sharp division of opinion about the usefulness of flaps while soaring. The Poles, who have tried various types of flap on a whole succession of designs, seem to be reaching the conclusion that any flap, which for its action is dependent on the opening of a slot, does more harm than good.

T. Kostia (Poland) considered that opening any form of slotted flap takes at least two units off the lift/drag ratio. The Czechs apparently do not agree and one wonders whether the precision of the detail design and manufacture of their flaps has something to do with this. On the Spartak—as on the Démant and Blanik—it appears that extremely high standards of surface profile, accurate fit and precise actuation of the flaps have been achieved.

**The EoN Olympia 419.** This British sailplane (described in THE AEROPLANE of June 6, 1958) is the latest of a line of development which has been undertaken by Elliotts of Newbury during the past five years. Work started with the fitting of a new laminar section 15-metre wing on a standard EoN Olympia 2 fuselage. This aircraft, known as the 401, flew in the 1954 International Championships at Camphill and in the British Nationals in the following year. The 402 which took part at St. Yan in 1956, was the 401 fitted with an extended wing of 16.8 metres' span. At the 1957 British Nationals, the 16.8-metre wing was fitted to a new and largely redesigned fuselage and a completely new tail unit with all-moving tailplane and anti-balance tab. This model was known as the 403.

The 419 is the 403 redesigned to have an 18.9-metre wing and with certain changes to the fuselage and tail unit. The result of this development progression is a machine with an exceptional performance which has nothing in common with the original Olympia except its name—and it is, perhaps, rather a pity that this has not been changed.

With greater luck on one day, the Olympia 419 in the capable hands of Tony Deane-Drummond might have won the Championships. However, it distinguished itself even in seventh place. This was a fine performance for a design which made its first flight on March 29, 1958. In addition, Deane-Drummond was most enthusiastic about the machine's handling characteristics.

The 419 achieves its high performance by entirely conventional and straightforward methods. Indeed, its only unusual feature is the all-flying tail with anti-balance tabs of the type which was first tried in this country by H. Kendall on the Broburn Wanderlust in 1948.

There are no flaps on the 419, retractable undercarriage or "fancy" canopy arrangements; no ingenious rigging features (other than the now almost conventional upward-folding tail), tip shapes or clever air brakes. Just a straightforward progressive evolution from the classically simple original Meise design.

Perhaps this is as far as one can usefully go with this approach and British designers will from now on have to take notice of developments on the Continent and attempt more than can be achieved with a laminar section, an extended span wing and a modest standard of profile waviness such as is achievable with long-established structural techniques. For one thing, gliders without built-in wheels are an anachronism in 1958. In the high performance category this wheel should be retractable, as it was on the vast majority of Open Class designs at Leszno.

*(To be concluded)*

# H.J.C.'s CLUB COMMENTARY

● SOUTHEND'S **Municipal Air Centre and Flying School** has been able, through greater use of its aircraft, which are averaging 650 hr. a year, to reduce flying rates. Dual and solo rates are now the same, £4 5s. an hour on the Austers, £4 10s. on the Autocar and £5 5s. on the Chipmunk. Night flying costs £1 extra in each case.

It is now possible with these charges for a pupil to get a P.P.L. at Southend for £127 10s. and a C.P.L. for £765, plus £11 for the full-time technical course at Southend Municipal College.

In June a total of 371 hr. was flown. Night flying, mainly for C.P.L. pupils, is very heavily booked. More than 150 night cross-country flights for the M.T.C.A. dispensation are made annually.

● INSTRUMENT ratings have recently been obtained by Messrs. S. Cann, P. Finucane, J. Goodwin, J. Nichols, K. Campbell and G. Barrett, who are now passed for commercial flying.

Messrs. J. Gaffney, P. Haenni and P. Treadaway have gained their C.P.L.s; P.P.L.s have been issued to Miss Helen Baker and Messrs. S. Brown, M. Brett, M. Fullarton, V. Pearson, K. Woodhams, Carfoot and Butcher. First solos have been flown by Messrs. May, Newman, Grey and Stetzel.

Mr. J. K. Keats has recently been appointed C.F.I. in succession to Gerry Quinn. Mr. B. Warman, who has been instructing part-time for many years, has joined the permanent staff, as has Mr. L. Swanepoel, an ex-S.A.A.F. C.F.S. instructor, who was formerly with the East Rand Flying Club at Johannesburg.

● AT the **East Bucks Flying Club**, which flies from Denham, two members—Messrs. J. Richardson and L. Pond—have recently gained their assistant instructors rating.

The C.F.I. is Gp. Capt. Gordon Carey, with Sqn. Ldr. Jack Aireys as assistant; and Sqn. Ldr. F. Bugge and Flt. Lt. R. Atkinson are also on the instructional staff.

P.P.L.s have recently been gained by Messrs. Oakford, Lanagan, Simpson, Barough and Wetherilt and Dr. Beighton.

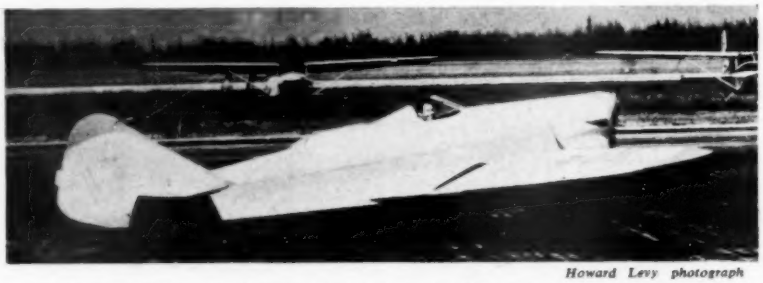
● REFERENCE to the latest edition of the A.R.B.'s "British Register of Civil Aircraft" shows that a Currie Wot (See THE AEROPLANE, May 16, p. 695) has now been registered (G-APNT) in the name of Mr. V. H. Bellamy, who is manager of the Hampshire Aeroplane Club at Eastleigh, Southampton.

Another interesting entry is the Garland Bianchi Linnet (G-APNS) which is a Piel Emeraude ultra-light two-seater of French origin (90-h.p. Continental engine) built by Mr. Doug. Bianchi. It is to fly shortly.

● A REMINDER of two club events this week-end: first, the visit of NATO air cadets to the **Surrey Flying Club** at Croydon. This visit has been arranged between Mr. "Eustace" Miles, of the **Association of British Aero Clubs**, and Wg. Cdr. G. J. Rayner, of R.A.F. Home Command, and 10 cadets (two each from France, Holland, Italy, Sweden and Turkey) will see how the club-flying movement operates in the United Kingdom.

The other event is the tea patrol organized by the **Elstree Flying Club**. The C.F.I., Mr. David Ogilvy, writes that it is to be a "really bumper" occasion; *all* clubs and private owners have been invited, so it is only a matter of praying for good weather to make this a memorable patrol.

The defence zone will be from 1,200 ft. to 2,000 ft. above aerodrome level, and attackers will be safe when in the legal circuit area, i.e., 3,000 yd. from the aerodrome boundary. Attacking times are from 15.45 hrs. to 16.15 hrs. B.S.T.



*Howard Levy photograph*

MILES SURVIVAL.—Still flying in the U.S.A. is this Miles Sparrowhawk, built for the 1935 King's Cup Air Race. It is now owned by Mr. George Roberts, of West Palm Beach, Fla., and registered N191M.

# Correspondence

## What is a First Flight?

*From Professor E. J. Richards, O.B.E., M.A., B.Sc., F.R.Ae.S.*

SO much speculation surrounds any claim of being the first to fly, the first to use some scientific method or the first to invent some new form of aircraft, that it is not surprising that the first concern of any committee set up to pronounce on the matter is to determine some simple formula of achievement on which to base its decision, even though this formula takes no account of a number of imponderables which nevertheless contribute greatly to the value of the achievement. Thus the Gorell Committee* emphasized the need for a flight of at least 1,320 ft. in length in order to provide certainty that "the machine, having left the ground, is maintained in the air by its own power on a level or upward path, for a distance beyond and over which gravity and air resistance would sustain it."

The basis of this need for a long length is repeated by Griggs in his recent article, "Powered Hops of Pioneer Aircraft" (THE AEROPLANE, July 25 last), which illustrates the difficulty of distinguishing between real level flights and hops arising inadvertently due to bumps on the airfield, gusts, or by building up of excess speed on the ground. Thus he shows, for example, that if the power available is only 0.8 of that needed for level flight, a hop of 150 ft. can be achieved if the aircraft meets a sudden horizontal gust 6 ft./sec., while a similar length would be achieved in a perfect "modified ballistic trajectory" in which only 90% of the weight is taken by the lift and in which the initial direction of the aeroplane is assumed upwards at an angle of 5° to the ground following a bounce on rough ground.

However, these distances all depend critically on an arbitrary set of initial conditions at the time of the flight and can in fact, by suitable choice of these initial conditions, amount to any prescribed length of flight whatsoever. Hence it is doubtful whether they contribute greatly to the establishment of a minimum distance as formulated by the Gorell Committee.

With regard to gusts, for instance, the emphasis placed on the need for good flying control in an era in which the pioneers built and flew their craft with little knowledge of what was to happen, often resulted in such flights occurring in early morning or late evening when gusts were practically non-existent. Indeed, one of the great difficulties in obtaining witnesses for these early flights arises specifically from this practice of early-morning flying.

In the same way, in regard to the possibility of flying a perfect "modified trajectory" course of length 150 ft. and height at its peak of 3 ft., surely this can only be a "scientific abstraction" of the flight paths of those early days when stable flight, lateral stability and balanced controls were still unknown. For example, in his book "The Wright Brothers," Kelly explains how during their first powered flight "the course of the flight up and down was exceedingly erratic, partly due to the irregularity of the air and partly due to lack of experience in handling this machine." Thus, although this flight was very short in length, and in the length category of a hop according to this country's rules, there can be little doubt at all that at several stages in the flight the aircraft weight was being fully sustained by its lift. To put a large factor of reserve on to these "modified trajectory" lengths and thus to deduce, as we have done in this country, that no flight can be acceptable if of less than 1,320 ft. is an absurd case of British ultra-caution which does great injustice to the real achievements of such pioneers as Cody and A. V. Roe, who not only designed and built their machines but also learned to fly and control them satisfactorily.

It seems to me that rather than add factor upon factor, it is better to cast idealistic calculations to one side and to accept as a "real flight" one in which the aircraft has stayed in the air for a period of time of a different order of magnitude from that taken to descend to the ground if the lift is taken off due to change of incidence. Thus, while no claim can be made that the aircraft was being sustained all the time, the statistical probability would be high that at some stage in the flight the aircraft would be sustained by its own lift. Incidentally, this emphasis on time rather than length would also allow hovering flights of flying bedsteads, helicopters, and any future man-powered systems to be acceptable as "flights" and would eliminate the claims of rifle bullets which are capable of forward flights of considerable length without any appreciable sustenance from their own lift.

The crucial issue, if the above were acceptable, is of course that of defining a "different order of magnitude." In scientific circles this has usually implied a factor of ten, though there is no great magic in this figure and a higher or lower figure may be justifiable in any particular instance. If a figure of ten is acceptable, then for a 30-m.p.h. flight three feet from the ground, a flight of 190 feet in length would be required to ensure a satisfactory probability of sustained flight. Conversely, on the basis of the Gorell Committee's insistence on a distance of 1,320 feet, the magnitude difference is not ten but seventy!

Since we lagged behind the U.S.A. and Europe in this matter of leaving the ground in powered flights, the only realistic figures to take are those that are acceptable to these two cases. In the U.S.A., the Wright brothers' first flight extended over a time of 12 seconds and a mean height of nine feet making a magnitude order of 16 and an actual flown length of 120 feet (owing to the large headwind). In Europe, Santos Dumont is credited with the first powered flight on October 23, 1906, though the length of the flight was not greater than 200 feet and its duration some eight seconds, a magnitude order again of about ten. Thus, flights of duration of ten or fifteen times the time of a ballistic fall are acceptable to other countries and provide a good probability of ensuring sustained flight while not requiring anything like the long distances required by the Gorell Committee.

In view of the raging controversy regarding A. V. Roe's flight in June, 1908, it is interesting to examine his achievement in the light of the above. Some doubt exists regarding the length of the flight, though a distance of 150 feet is quoted by some observers. This distance involved a flight time of eight times that of a ballistic drop from the height of flight, a reserve factor less than those of the accepted first flights but, sufficiently high to ensure a reasonable probability that level powered flight was achieved during the hop. Since eyewitness accounts confirm this distance and also that A. V. Roe "flew level and not as a hop," it may well be that as a result of our excessive caution in specifying the long and purely arbitrary flight length of 1,320 feet as a minimum distance, one of our great pioneers, who proceeded afterwards to establish two of our leading aircraft firms and who designed, built and flew his own aeroplane is being given less than his full share of credit in early flying in this country.

Southampton University, Hants. ELFYN RICHARDS.

* Which sat in December, 1928, to consider the claims of those who sought to be the first Englishman to fly on English soil.—ED.

## Roundabout

**Fun with Frye.** Eldon Frye, Convair's assistant advertising director, is one man I'm glad is Convair's assistant advertising director. Otherwise, I might be out-columned, for he writes, draws *and* edits their house journal, the title of which is the sort of gruesome pun which this column usually deals in—"Convairiety."

*

**Fun with Frye—2.** Eldon has sent me a copy of his special planetary issue "Convairiety." Much of its humour is local, but one item should amuse all.

Under this picture, which I seem to recognize, the caption alleges that the inhabitants of the planet

O'Toole when working on "the largest home-built aircraft, started with a monoplane, but discovered they didn't have enough lift so they added a wing and found they didn't have enough power so they added an engine which made it too heavy so they added a wing and found they were underpowered so they added an engine. . . ."

*

**Big Fleas . . .** It had to come, I suppose, the simulator simulator. Up at Hatfield the D.H. Servicing School have just built one called a Comet Systems Trainer, which does just that.

by Gnome

# NOTES AND EVENTS

POSTER CAMPAIGN.—Last month Operation Britain inaugurated its nation-wide poster campaign publicizing British achievements in co-operation with the Poster Industry. One of its first posters is the one above, advertising the aircraft industry.

**ALUMINIUM CHANGE.** — Aluminum (Canada), Ltd., has now moved to 30 Berkeley Square, London, W.1. The telephone number, Mayfair 9721, remains unaltered.

**DESOUTTER ADDITION.**—A new $\frac{5}{16}$-in. capacity screwdriver and nutrunner —type SR8/500—has been added to the Desoutter Bros., Ltd., range of tools. Weighing 4 lb., it has a free speed of 500 r.p.m. and an adjustable spring-loaded clutch.

**INSTRUMENT HEADQUARTERS.** B. and K. Laboratories, Ltd., of 57 Union Street, London, S.E.1, has taken over additional premises at 4 Tilney Street, Park Lane, W.1. As from September 1, sales inquiries will be dealt with at the new premises, which will contain a permanent show of international developments in electronic instrumentation.

**PLANNAIR FACTORY.** — A new factory being built at Leatherhead by Plannair, Ltd., will add approximately 15,000 sq. ft. of floor area to the company's existing capacity. Due to be completed in October, the new facility will incorporate research laboratories equipped with climatic test chambers and high- and low-temperature cabinets.

**ACTUATOR BROCHURE.** — The Plessey Co., Ltd., of Ilford, Essex, has produced a comprehensive publication on the development and performance of electrical actuators. Under the title of "Electrical Actuation," the brochure contains more than 250 photographs, installation drawings, performance curves and specifications of units used in the aircraft and other industries.

**PRECISION CASTING.**—The Mercast process of precision investment casting is now being undertaken in this country by Sankey-Telcon, Ltd., of Crawley, Sussex. Employing frozen mercury as the pattern material, the process is used for the production of aircraft and gas-turbine castings and missile components.

**NATO INSTRUMENTS.** — Two scientific measuring instruments manufactured by Wayne Kerr Laboratories, Ltd., of Chessington, have been adopted by NATO. These are the company's component bridge B.521 for the direct measurement of electronic components, and the type S.121 audio-frequency oscillator.

**AIRCRAFT BATTERIES.**—Following a three-month flight test period, B.O.A.C. is re-equipping its DC-7C transports with BPA5-1-type batteries manufactured by Oldham and Son, Ltd., of Manchester. Each aircraft has two of these main batteries in its electrical system. The Corporation's Argonauts and Stratocruisers are also fitted with Oldham batteries.

## Company Notices

**NEW COMPANY**

**Aero-Marine Engineering Co. (North Wales), Ltd.** (608,029).—Private co. Reg. July 16. Cap. £100 in £1 shs. Directors: Richard A. Roberts, and Mrs. Barbara J. Roberts, both of 168 Speke Rd., Garston, Liverpool, 19; Douglas D. A. Fraser and Mrs. Olive J. Fraser, both of Plas-Madoc Villa, Plas-Madoc, Ruabon. Sec.: Olive J. Fraser. Reg. office: Bryn-Y-Mor, Turkey Shore, Holyhead.

**NEW COMPANY (OVERSEAS)**

**Middle East Airlines Company, S.A.** (F.4,716).—Particulars filed July 15, 1958, pursuant to Section 407 of the Companies Act, 1948. Cap.: L.L.6,250,000 in L.L.100 shs. Reg. in Lebanon in 1950. British address: 69 Piccadilly, London, W.1. Foual I. Sidrassi, of 19 Ennismore Gardens, London, S.W.7, is authorized to accept services of process and notices. Directors: Sheikh Najib Alamuddin, H.E. Jamel Bey Mikaoui, H. E. Salim Bey Lahhoud, Yusuf Bey Bedas, Abdullah Bey Salaan, Dr. Fawzi Daouk, Fawzi Bey El Hoss, and Cyril Esscly, all of Beirut, Sir Wilfred G. Cribbett, K.B.E., C.M.G., Sir Francis J. E. Brake, M.I.E.E., Sir Duncan C. Cumming, K.B.E., C.B., and Kenneth W. Bevan.

**CHANGE OF NAME**

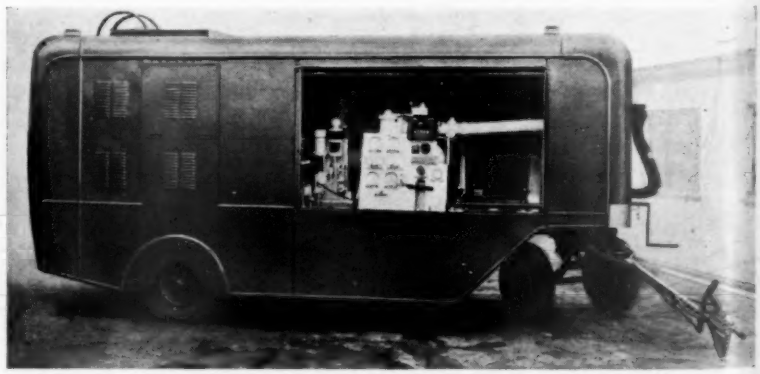
**Aero Research, Ltd.** (286,630).—Hinxton Road, Duxford, Cambridge. Name changed to CIBA (A.R.L.), Ltd., on June 30, 1958.

**INCREASE OF CAPITAL**

**Rollason Aerocessories, Ltd.** (502,651).—Manufacturers and designers of aeronautical components, etc., 53 Eastcheap, London, E.C.3. Increased by £48,000 in £1 ordinary shs., beyond reg. cap. of £2,000.

## Aviation Calendar

**August 1-16.**—World Parachute Championships organized by the Czech Aero Club at **Bratislava,** Czechoslovakia.
**August 10.**—Tea Patrol organized by Elstree Flying Club at **Elstree Aerodrome.** (15.45-16.15 hrs.)
**August 10.**—Visit of NATO air cadets to Surrey Flying Club, **Croydon.**
**August 16-17.**—Second Wines-of-Alsace rally organized by the Aéro-Club Centre, **Alsace,** France.
**August 18.**—International Military Aeronautical Pentathlon, at **Ostend,** Belgium.
**August 31.**—Oxford Aeroplane Club "At Home," at **Kidlington Airport,** Oxford.
**September 1-7.** — S.B.A.C. Display and Exhibition, at **Farnborough.**
**September 4-6.**—AGARD Avionics Panel Meeting, at **Cambridge University.**
**September 8-13.** — First International Congress of the Aeronautical Sciences, **Madrid.**
**September 12-22.** — Aeronautical Pentathlon and Air Rally at **Liège,** Belgium.
**September 15-21.** — Battle of Britain Week.
**September 21.**—Sailplane aerobatic competition organized by the London Gliding Club, at **Dunstable,** Beds.
**September 21.**—Air Rally organized by the Milan Aero Club, at **Milan.**
**September 21.**—Royal Belgian Aero Club international concourse for balloons, **Brussels.**
**September 26-29.**—Austrian Aero Club Rally at **Innsbruck.**



REFUELLING DISPENSER.—A new pressure re-fuelling dispenser for use with the English Electric P.1B has recently been built by the Truro Engine Works, Ltd., of London. Consisting of a 4-in. Pegson Marlow 4EG-4 pump driven by a Dorman 52-h.p. Diesel engine, the dispenser can be employed for fuelling or de-fuelling the P.1 from A.E.C. re-fuellers or underground tanks, and for transferring fuel from underground tanks to the re-fuellers.

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